TECHNOLOGICAL CHANGE AND RURAL DEVELOPMENT

A CASE STUDY IN LESOTHO

Anton A. Eberhard

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ABSTRACT

The problem of technological change in rural development in Third World countries is approached through an examination of the question of which factors govern the choice and adoption of new technologies. The literature on technological change and development is reviewed and rural development programmes in Lesotho are discussed within the context of an analysis of the rural environment and the structure of the economy. Two key features of the country's economy which affect technological change are identified. Firstly, the migrant labour system, which is a consequence of the historical development of the regional economy being dominated by mining capital, has shaped the attitudes of rural households towards investment in new technologies and has constrained the development of traditional agricultural knowledge and practices. Secondly, foreign aid has become a major vehicle for the introduction of new technologies, but its effect on the choice of technology is paradoxical. One effect is to skew the choice towards imported capital-intensive technologies. But the pervasive ideologies incorporated in aid policies, with their emphases on appropriate technology and the meeting of basic needs of the rural poor, may give rise to rural development programmes which counter the above effect. One example, from Lesotho, is the introduction of locally manufactured solar energy technologies. The significance of technical knowledge transferred in rural development programmes is indicated and the relationships between ideology, interests and knowledge are briefly discussed. The failure of agrarian societies to adopt technological change is attributed, in part, to the origins and nature of the knowledge introduced through aid-directed rural development programmes.

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And lastly, I would like to acknowledge the support of my wife, Lucia, and the extra demands made on her, my daughter, Frances, and my newly-born son, Matthew, particularly during the final preparation of this thesis.

DECLARATION

I declare that this thesis has been composed by me and that the work contained therein is my own.

A.Eberhard 15th November, 1982.

CONTENTS

TABLES

ACRONYMS

ANC	African National Congress, South Africa
AT	Appropriate Technology
ATI	Appropriate Technology International, Washington
BASP	Basic Agricultural Services Programme, Lesotho
BCP	Basotho Congress Party
BEDCO	Basotho Enterprise Development Corporation
BNP	Basotho National Party
CCPP	Cooperative Crop Production Programme, Lesotho
CES	Constant Elasticity of Substitution
CIDA	Canadian International Development Agency
CPDO	Central Planning and Development Office, Lesotho
CRS	Catholic Relief Service
DAC	Development Assistance Committee, OECD.
DANIDA	Danish Development Agency
DDC	District Development Committee
ECA	Economic Commission for Africa
ECLA	Economic Commission for Latin America
EDF	European Development Fund
EEC	European Economic Community
ESCOM	Electricity Supply Commission, South Africa
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GNP	Gross National Product
GoL	Government of Lesotho
IDA	International Development Association, World Bank
IDB	Inter-America Development Bank
IDRC	International Development Research Centre, Canada

IDS	Institute of Development Studies, Sussex
ILO	International Labour Organisation
INTINTEC	Peruvian Industrial Research and Technical Standards Institute
ISI	Import Substitution Industrialisation
IT	Intermediate Technology
ITC	Indigenous Technological Capability
ITDG	Intermediate Technology Development Group
LCU	Labour Construction Unit, Lesotho
LEMA	Lesotho Engineering and Mechanical Agency
LLA	Lesotho Liberation Army (Armed Wing of the BCP)
LNDC	Lesotho National Development Corporation
MFP	Marema Tlou Freedom Party
MTP	Marema Tlou Party
NIC	Newly Industrialised Country
NIEO	New International Economic Order
OAU	Organisation for African Unity
ODA	Official Development Assistance
ODM	British Overseas Development Ministry
OECD	Organisation for Economic Cooperation and Development
PCV	Peace Corps Volunteer
PEMS	Paris Evangelical Missionary Society
PMU	Police Mobile Unit, Lesotho
R&D	Research and Development
RET	Renewable Energy Technology
SACP	South African Communist Party
SACU	South African Customs Union
SADCC	Southern African Development Coordinating Committee
SAWB	South African Wool Board

SFYDP	Second Five Year Development Plan
SIDA	Swedish International Development Agency
STPI	Science and Technology Policy Instruments
TFYDP	Third Five Year Development Plan
TNC	Transnational Corporation
TTRDP	Thaba Tseka Rural Development Programme
TTCC	Thaba Tseka Coordinating Committee, Lesotho
UN	United Nations
UNCDF	United Nations Capital Development Fund
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organisation
USAID	United States Agency for International Development
VDP	Village Distribution Point
WFP	World Food Programme

PART ONE

INTRODUCTION TO TECHNOLOGICAL CHANGE AND DEVELOPMENT

CHAPTER ONE

INTRODUCTION

The development of human societies has always been closely associated with technological change. The introduction and adoption of new technologies has enabled the discovery and exploitation of new resources, increased productivity from existing resources, expanded the level and variety of consumption, and provided greater material welfare for the society concerned.

The differing degree to which technological change has occurred in various societies has long been most evident between the industrialised countries, of Europe and North America, and that group of countries, once colonies, and now commonly referred to as the Third World. It is also evident, in spite of three decades of development assistance to Third World countries, that disparities in technological capability and material welfare remain as large as ever. The total African share in world manufacturing value added, for example, has risen from 0.6% in 1960 to only 0.8% in 1975 [Fransman (1982a), p 1]. Nowhere are these problems more evident than in the area of rural development. The great majority of the population of the Third World reside in rural areas and it is here that the greatest needs arise for improvements in material welfare. Yet it is also in rural development that efforts to achieve technological change have been spectacularly unsuccessful. International aid agencies have given much publicity to policy statements which stress their concern for assisting the rural poor, but they are seldom able to point to projects where aid has been successfully translated into sustained material benefits for the recipients.

In spite of the growth of a vast body of academic literature and research studies in the field of development theory, many of the problems implicit in technological change are still inadequately understood. Again, this is, perhaps, most apparent in the area of rural development where the inability, reluctance or refusal of poor agrarian households to adopt new technologies continues to perplex and frustrate government bureaucrats, aid personnel and research workers alike.

By posing the problem in this way it is not intended to confer approval or any inherently positive value to these attempts to effect technological change. Indeed, as will become apparent in this thesis, many of these programmes have been misconceived in their motives and have failed to take into account adequately the constraints, views and knowledge of rural households. It may also be argued that rural development depends less on new technology than on changes in the structure of political and economic power, but it remains the case, nevertheless, that technological change makes improvements in material conditions ultimately feasible.

Technological change is a process which primarily involves the choice and adoption of new technologies. Two overriding questions will thus be addressed in this thesis:

[1] Which factors govern the choice of new technologies?

[2] Which factors govern the successful adoption of new technologies?

These questions will be posed within the context of rural development in the Third World. The term "rural development" is used in this

thesis in the sense adopted by most international aid agencies and may be defined as:

> ".....a process of socio-economic change involving the transformation of agrarian society in order to reach a common set of development goals based on the capacities and needs of people. These goals include a nationally determined growth process that gives priority to the reduction of poverty, unemployment and inequality, and the satisfaction of minimum human needs, and stresses self-reliance and the participation of all the people, particularly those with the lowest standard of living" [UNDP (1979b), p 1].

These concerns have not necessarily always been given expression in rural development programmes but, in recent years, most aid agencies, and many Third World governments, have incorporated these notions in their policy pronouncements on rural development. Rural development is thus not merely a narrow sectoral approach to agricultural development but also incorporates broader welfare objectives.

Two approaches to the study of rural development and processes of technological change in agrarian Third World nations have been considered by the writer. The first relies on an analysis of the internal socio-economic conditions of rural society and examines the ways in which traditional practices and customary modes of behaviour may function to constrain the adoption or acceptance of technological change. An example of such an approach is the study by Winnington (1979) of technical innovation in a Mexican village which concluded that the choice and adoption of new technologies by villagers was rational within the perceived risks, potential returns and prestige associated with the technology. Village life was based on a tradition of survival over many centuries and villagers were understandably cautious about the abandonment of their tradition as, in so doing, they may have been limiting their capacity to survive. He argued further that for an innovation in production to occur spon-

taneously it must be seen by the potential innovator not only to offer a benefit over existing practices, but also to present a risk not significantly greater than that associated with existing practices. In addition, villagers were found to be naturally suspicious of outsiders actively "selling" new ideas; in practice, villagers took what they could without making any commitment to the development project.

It is interesting to note, in passing, that when this same "internalist" approach is applied to an analysis of the factors governing the choice of technologies by aid agencies, within development programmes, remarkably similar conclusions are arrived at concerning the role of risk avoidance, and the reliance on established and traditional practices. One of the very few studies of the influence of aid agencies on the choice of technology concluded:

> "Ultimately, it was the organisational requirements of the implementing agencies, including the aid donors, that determined the choice of tubewell technology for East Pakistan. In the actual decision making, such factors as risk avoidance, appearance of modernity, established procedures, familiar techniques, and by no means least, control, outweighed development policy objectives. It is in these factors that an understanding of decisions as to choice of technology must be sought [Thomas (1975), p 57].

Although these conclusions are no doubt valid (indeed, many of these features will be noted in the case study in this thesis) they remain a static explanatory account of technological change and fail to take into account the importance of the interaction between agrarian society, the national and international economy, and agents of change such as foreign aid organisations.

A more dynamic explanatory analysis is adopted by political economy, the second broad approach for understanding processes of technological change in rural development. Internal socio-economic structures

in a society are related not only to productive activity, but also to the distribution of power and knowledge at both the national and international level. The form of analysis adopted in the political economy approach will become clearer in the critical review of the literature on technological change and development in Chapter Two.

One view of technology which has received much attention in development programmes of the last decade is that of appropriate technology. The literature has been approached through an analysis of the different interpretations of the notion of appropriate technology which have been made by the development community; it is believed that this is the first time that such an analysis has been related to the broader literature on technological change and development theory. Two main interpretations of appropriate technology are identified and these have been related to questions such as the choice of technology, research and development, the relationship between science and technology, innovation and the development of indigenous technological capability in Third World countries. The origins of the notion of appropriate technology are traced and the technological determinism implied in the conception is criticised. A political economy analysis of technological change is advocated, and this approach is contrasted with modernisation, structuralist and dependency schools of thought in development theory. The review of the literature thus provides a framework which is applied to the case study on rural development and technological change.

It should be noted here that although the relationship between industrialised countries and the Third World is often unqualified in the general discussion in the thesis, the reader should not assume that these are references to two homogeneous categories of countries.

Clearly, the historical development, economic structure and cultures of individual countries differ widely and any generalisations must be treated cautiously. It is this perspective which has resulted in the major portion of this thesis being devoted to a case study of one particular country, Lesotho in southern Africa.

The writer spent a period of 10 months, from September 1980 to June 1981, undertaking field work in Lesotho. Most of this time was spent living in the village of Thaba Tseka which has become the site of one of the largest rural development projects in the country. Part Two of this thesis is thus devoted to an examination of technological change in rural development in Lesotho. Chapter Three examines the political and economic structure of Lesotho, including its historical development. Chapter Four is devoted to a discussion of the rural environment, the effect of Lesotho's political economy on agrarian society, and the history of colonial intervention in rural development. The chapter provides the context in which modern post-independence, aid-directed rural development programmes have been undertaken. The objectives and nature of these programmes are discussed in Chapter Five, where particular emphasis is given to the Thaba Tseka Rural Development Programme. Most of these programmes involved attempts to introduce new agricultural technologies which included the minimum of local research and innovation. Chapter Six, though, is devoted to an analysis of a research and development project for solar energy technologies at the Thaba Tseka Rural Technology Unit.

The information presented in the case study is derived from project documents, informal interviews and personal observations made during the field trip. Where no specific references are cited it should be

assumed that the data derives from the latter two sources.

The final part of the thesis presents conclusions as to the factors which have determined the choice and adoption of new technologies in Lesotho. These conclusions are widened to assess the significance of aid in processes of technological change in poorer, agrarian Third World nations. The ideological character of aid policies is demonstrated, and the nature of interests and knowledge in technical assistance programmes, is discussed.

The failure effectively to transfer technical knowledge in rural development programmes, to meet aspirations for material advancement, remains a complex problem. It is hoped that this thesis will offer a new approach to the problem and will point to areas for possible research.

CHAPTER TWO

TECHNOLOGICAL CHANGE AND DEVELOPMENT: A CRITICAL REVIEW OF THE LITERATURE

Concern about the appropriateness of technologies transferred from modern industrialised countries to the Third World is not new. Since the early 1950s, economists have been concerned as to whether technologies transferred to and utilised in the Third World have used factors of production, such as labour and capital, in proportions close to the pattern of factor endowments found in these countries [Eckhaus (1955)]. But, it was not until the end of the first United Nations Development Decade (in 1970) that orthodox development experts began to question seriously the wisdom of the unrestricted transfer of Western science and technology to the Third World.

The optimism of the 1950s and 1960s was characterised by a view which saw the solution to the "underdevelopment" of the Third World as lying in part in the importation of already developed, modern technologies which would increase growth rates and hence, supposedly, speed up the process of development. But with the increasing gap in income per capita between the rich and the poor countries, accumulating debts under aid programmes, increasing un- and under-employment, and the growth of rural poverty, a more sceptical and critical analysis has emerged of the role played by Western science and technology in the development process (1). A burgeoning literature has begun to

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(1) Members of the Institute of Development Studies and the Science Policy Research Unit at the University of Sussex have been influential in this critical evaluation. See for example "The Sussex Manifesto", written for the United Nations World Plan of Action for the Application of Science and Technology for Development [Institute of Development Studies (1970)].

examine the factors which influence or determine the choice of techniques, technological innovation, the manner in which technology is transferred to the Third World, and the kinds of science and technology institutions which would facilitate indigenous technological development (2).

More recently, an awareness of a radical tradition in political economy has grown - one which has emphasised the importance of the system and structure of production in determining the nature of technological development, particularly within the continuing evolution of world capitalism (3). Although the latter work constitutes only a small part of the literature on the subject of technology and development, the method of analysis employed offers, in the view of the writer, the best opportunity for a thorough understanding of the way in which technology is generated, and of the role it plays in the development process.

These trends have matched, and have been influenced by, a parallel evolution in development theory. Early work, typified by Rostow's "stages of growth" theory, assumed that the development of the Third World would proceed in much the same way as the industrialised capitalist countries had previously experienced [Rostow (1960)].

However, in the late 1960s and 1970s, dependency theory sought to show that:

> "the socio-economic state of the developing countries is not merely 'economic underdevelopment', not just a sign of

(2) The bibliography at the end of this thesis provides a fairly extensive list of titles on the general subject of technology and development.
(3) See particularly chapters 13, 14, and 15 of Karl Marx's Capital Volume 1; Dickson (1974), Gorz (1976), Rosenberg (1976), Slater (1980), and Levidow and Young (1981).

> their not having participated in development, of their having fallen behind in progress, but it is the product of a specific development, which is most closely connected with, moreover derived from, the development of capitalist world economy" [Szentes (1976), p132].

More recently a body of literature has arisen which has been critical of the loose neo-Marxian concepts of the dependency school, and which employs a more rigorous analysis of the penetration of capitalism in Third World countries [Laclau (1971); Kay (1976); Leys (1977); Taylor (1979)]. An examination of the uneven manner in which this has occurred, and of the co-existence of pre-capitalist modes of production in many of the poorer and rural regions, has provided the context within which processes of technological change and rural development must be studied.

In this chapter an attempt is made to examine some of the more important trends in the theory on the relationship between technology and development. This will be undertaken (in perhaps an unusual way) by reviewing critically the literature on one of the more populist concepts to emerge in this area - that of the notion of appropriate technology.

This has been done for three reasons. Firstly, the notion of appropriate technology has become influential over the past decade, and has become incorporated in the aid policies of all the major donor agencies. As will become apparent as this thesis progresses, aid programmes in the poorer Third World countries have become an important source for the introduction of new technologies. The aid process has determined the nature of the technologies chosen and utilised.

Secondly, the notion of appropriate technology has been mostly asso-

ciated with the problems of rural development, which is the area of study of this thesis. As such, much of the fairly technical literature on industrialisation strategies and mechanisms for regulating the transfer of technology, will only be briefly mentioned.

And thirdly, the concept of appropriate technology often incorporates an awareness of the social implications of the choice of technologies. Thus a critical evaluation of the concept will deal not only with such aspects of technological change as the choice of techniques and technological innovation, but also with the way in which technological development relates to social structure.

APPROPRIATE TECHNOLOGY

With the multitude of inchoate ideas, literature,and practice that have arisen over the past decade around the notion of appropriate technology, has come a confusingly wide range of interpretations and meanings that have been attached to the concept (4). Appropriate technology has become an accepted term for a family of concepts including the terms "intermediate", "soft", "utopian", "ecologically sound", "progressive", "low cost", "labour intensive", "small scale", "inequality reducing", "village", "socially appropriate" and "alternative" technology - each of which places a particular emphasis on which kinds of technology are considered "appropriate".

Proponents of the concept of appropriate technology now vary from major development agencies, most of which have incorporated the concept into aid policy statements (5), to those involved in radical

(4) Surveys of the literature have generally been selective and incomplete. See for instance Jackson (1972), Ganiere (1973), Carr (1976), French (1977), Baron (1978), and Garcia (1979).
(5) USAID (1976), World Bank (1976), UNIDO (1977), ODM (1977), WHO

critiques of technological development in the industrialised countries, and to transnational corporations attempting to exploit new markets by claiming that technologies or products are in some way appropriate to the needs of Third World countries. The relative nature of the term "appropriate" inevitably results in a degree of confusion, and appropriate technology has come to mean little more than that which individuals themselves intend.

In reviewing the literature, various formulations of appropriate technology will be classified as belonging to either a narrow or broad conceptual interpretation (6). The narrow interpretation is a view that is generally favoured by neo-classical economists, where appropriate technologies are those that make efficient use of available resources and factor endowments. In contrast, within the broad interpretation, appropriate technologies are those that contribute to the meeting of particular development objectives. Although these are sometimes defined according to economic criteria, the broad interpretation often incorporates wider social, cultural and environmental factors.

(1978). Policies on appropriate technology have, however, remained primarily at the level of rhetoric. A recent survey at the United Nations concluded that, although nearly all agencies have published policy statements on appropriate technology, "activities in the field of science and technology by various UN agencies are not necessarily concerned with appropriate technology. We have based our conclusions in the light of the objectives of employment generation and the satisfaction of basic needs" [Floor (1979), p 157].

(6) This distinction was first made by Charles Cooper in a conference on appropriate technology in Teheran. See a summary of his contribution in Robinson (1979), p 403. Cooper's distinction however is different in that he merely differentiates between interpretations of appropriate technology that are favoured by economists and those adopted by ecologists.

THE NARROW INTERPRETATION

Development theory, in its attempt at explaining the enormous disparities in wealth between the industrialised and Third World countries, and of suggesting how these gaps might be bridged, has often concentrated on questions of production and technological change. The material wealth of a country is seen to depend on the production of goods and services through the co-ordinated use of available supplies of human skills, capital, land, and natural resources. Economic growth can stem from increased production through the use of more resources, and from increased productivity through the more efficient use of resources. Technology contributes to both, increasing the utility of available resources through increased skills, better methods and machines. Technology is thus one factor of change to be integrated into the overall planning of economic development.

In this scheme, the economic constraints on development in the Third World are seen to be:

[1] a shortage of investment resources to create infrastructure in order to provide capital equipment for new industries, to improve productivity in existing jobs, and above all to create new jobs; and

[2] a shortage of foreign exchange resources to provide for the high import content of Western-type capital investment, and for all the necessary inputs into new productive activities.

The cost of job creation using Western technology is high - even higher than for an identical plant in an industrialised country, where all the necessary support facilities are closer to the con-

struction site. Because of the scarcity of capital in most Third World countries, this kind of investment creates very few jobs and leaves the problems of massive underemployment and poverty untouched.

It is argued that appropriate technologies would be those which fully reflect the abundance or scarcity of available resources [Jones (1971); Eckhaus (1977); Robinson (1979)]. Capital intensive technologies from industrialised countries are in general regarded as inappropriate to the factor endowments of Third World countries, where capital is generally scarce and labour is relatively abundant. Furthermore if appropriate technologies are to be utilised, all factors of production should be valued at prices which reflect their relative scarcities. The appropriateness of technologies are set by shadow prices and opportunity costs and not by market prices. In many Third World countries, the latter are seen to be distorted by economic policies which:

[1] cheapen capital by subsidising interest rates or by offering incentive schemes to attract investment;

[2] inflate actual wage rates in excess of the true opportunity costs of labour through minimum wage legislation, unionisation and various welfare measures; and

[3] overvalue the exchange rate.

Ideally, it is argued, an appropriate technology is one which makes possible the production of a given good at a price not exceeding the current world price when:

[1] all factors of production are valued at prices which reflect their relative scarcities and opportunity costs and which will

permit the full employment of all available supplies of factors;

[2] the exchange rate is such that there is a balance of payments with this level of demand and activity, and when allowance is made for a normal inflow or outflow of capital;

[3] the rate of interest or discount is consistent with a balance between savings and investment at this level of near or full employment of all factors of production.

Critique of Neo-Classical Economic Theory of the Choice of Technique

The above approach is the one favoured by major aid and donor agencies such as the United States Agency for International Development.

> "In terms of available resources, appropriate technologies are intensive in the use of the abundant factor, labor, economical in the use of scarce factors, capital and highly trained personnel, and intensive in the use of domestically produced inputs" (7).

The underlying presuppositions of this view are those of neo-classical economics. Technology is understood to describe the relationship between inputs, or factors of production, and outputs. The relationship is expressed as a production function which enters economic analysis as a datum given by technological or extra-economic considerations.

For the production of some commodity there exists a range of techniques each of which combines the factors of production in different

(7) USAID (1976), p 11. It should be noted that this document also contains other criteria for the appropriateness of technology: "In terms of small production units, appropriate technologies are small-scale but efficient, replicable in numerous units, readily operated, maintained and repaired, low cost and accessible to low income persons. - In terms of the people who use or benefit from them, appropriate technologies seek to be compatible with local cultural and social environments"[ibid, pp 11-12].

proportions. A technique can be said to be "inferior" if some other technique exists which either produces the same quantity of the product required using less of at least one of the factors of production and not more of any other factor, or produces more of a given product using the same quantity of inputs as it does. All techniques which are not inferior are regarded as "technologically efficient." A production function consists of available technologically efficient techniques. Furthermore a technique is "economically efficient" if factor proportions are used according to their relative scarcities.

Conventionally, only two factors are considered: capital (K) and labour (L). The term "technique" is mainly used to denote concrete methods of production and refers to the ratio or proportion in which factors are utilised (K/L). The choice of technique is thus understood to be a choice of differing labour and investment proportions, with the relative prices of labour and investment being the determinants of this choice. This is shown in Figure 1.(8).

The isoquant (q) represents the range of efficient techniques using a wide range of varying factor intensities for the production of a chosen output. The entrepreneur is visualised as making his least cost decision by putting this technological data together with economic information derived from the market-place. In industrialised countries, for example, techniques would be chosen using relatively more capital (represented by the isocast II') and in Third World countries, appropriate choices of technique would be those utilising relatively less capital (TT').

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(8) This formulation is found in most economics textbooks. See for example Lipsey (1971), pp 221-231.

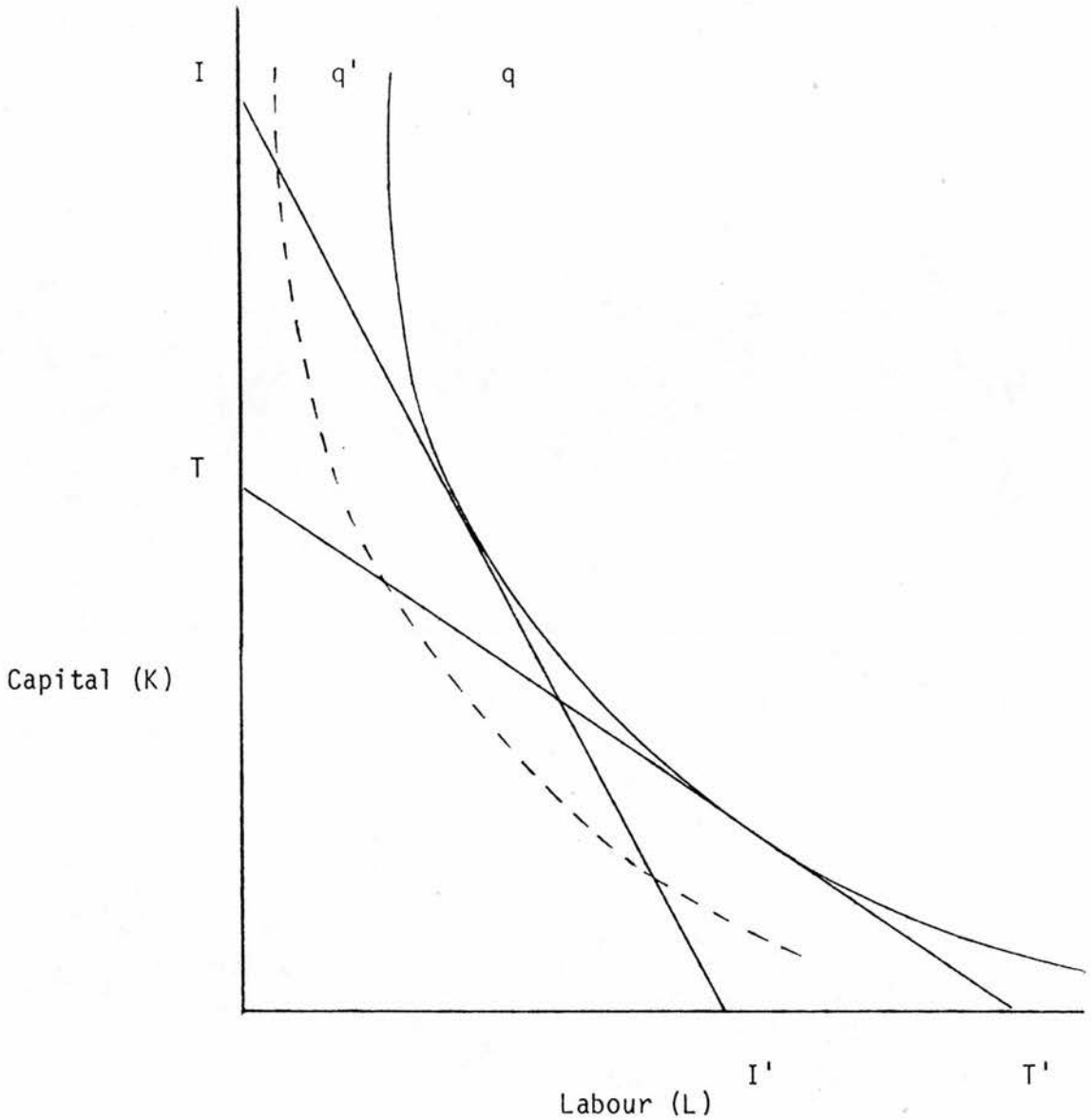

FIGURE 2.1 : Diagrammatic Representation of Production Function

The model assumes substitutability of labour and capital and a wide variety of techniques available to produce any given output. Ideally, the relative prices of capital and labour are presumed to adjust to the balance of supply and demand. The choice of technique adjusts then to the relative prices, such that full employment is ultimately reached. Hence neo-classical free market economists would argue that unemployment in developing countries is largely due to inappropriate production techniques which are encouraged through dis-

tortions in factor prices. Once these imperfections are corrected, it is assumed that more labour intensive technologies would be adopted.

Technical progress is introduced without altering the basic model and is assumed to be neutral, affecting all techniques equally. It is represented by a shift in the isoquant (q to q').

This model of the choice of technique has been criticised by, amongst others, Frances Stewart [1972, 1977].

[1] In picking on just two of many characteristics associated with each technique (investment and labour), the model completely ignores many other factors such as infrastructural requirements, labour skills and the nature of the product. In many cases the choice of production technique is ruled out once a choice of product is made. Inequality of income distribution leads to a pattern of demand for certain relatively expensive products which are generally overspecified for the requirements of most of the population of a Third World country. These products generally require a more capital intensive technique than the traditional products which they substitute. Capital intensive technologies, in turn, reinforce the disparities in income as high profits and wages characterise the small and modern industrial sectors.

Furthermore, the production function treats only a single output at a time, whereas, in reality, most processes yield several products (some desirable and some undesirable) from a given set of inputs. Joint production cannot be readily analysed within this framework.

[2] The model concentrates on only one selection mechanism - the relative price of labour and investment - which corresponds to only one type of decision maker - the profit maximising entrepreneur with unlimited access to investment resources. However, there is overwhelming empirical evidence that labour and investment are not the most significant variables in determining, nor are relative prices the sole criterion of, technical choice [Timmer et al (1975)]. One detailed case study on the choice of technology noted that:

> "The availability of external aid to finance new investment in itself affects the choice of technology, for the preference of the aid giver then becomes an important element in the decision-making process"[Thomas (1975), p 51].

Different groups of decision makers face different constraints, have different objectives and therefore make different choices. The interests of the transnational corporations predetermine (or at least constrain) the flow of technology to the Third World. Also, the state is not a neutral arbitrator but generally expresses the interests of higher income groups or the national bourgeoisie. These issues of political constraints are hardly ever discussed within the context of the choice of techniques.

[3] The static assumption of an unlimited range of techniques of varying labour and capital intensity does not accord with the nature of technological development. Contrary to the neo-classical economic assumption that technological change is merely an exogenous variable of the system, it can be argued that the historical development of technology has conditioned the availability, range and nature of technological choice facing Third World countries.

> The production of knowledge is usually a costly activity, and so technological alternatives representing factor combinations far from those justified by present prices are not necessarily known. Such technologies may be attainable theoretically but are certainly not readily available. Movement along the isoquant is not always possible, and a continuous production function represents a misleading idealisation which diminishes its possible usefulness for analysis of real economic phenomena. Research into new techniques is an economic activity which must be regarded as technological change rather than mere factor substitution [Green and Morphet (1977)].

In short, the neo-classical model of the choice of technique picks out only one minor aspect of technological choice, assumes a single type of decision maker, takes an a-historic view of the choice available, and ignores many of the more significant factors affecting technological change.

A caveat is perhaps necessary here. The preceding presentation of the production function has in some senses been simplified (9).

Undifferentiated factors of labour and capital need not necessarily be assumed. It is possible to draw distinctions between unskilled and highly skilled labour, and management, as well as between working capital and capital embodied in, for example, machinery and build-

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(9) This is true of Stewart's presentation - although by concentrating on the two factors of production (investment and labour), the essential assumptions of the model are made clear and the force of the criticisms are emphasised. It is certainly the case that most economic textbooks present the model in this way and that, in the field of policy formulation, many of the major aid and lending agencies understand the choice of appropriate technology in these terms.

ings. There have been attempts, in the so-called "embodiment hypothesis", at emphasising the importance of technical progress embodied in capital, differentiating between the various vintages of machinery which incorporate different levels of technical progress [Solow (1966), Massel (1962)]. The hypothesis states that if new technical knowledge can be embodied in capital goods, then more recent additions to the capital stock must be weighted. Hence investment, supposedly, becomes the main vehicle for technological change. However, investment acts on the absolute level of technology and not on the rate of technological change, which, in this model, remains largely an exogenous variable unrelated to previous investment or to capital formation.

The introduction of constant elasticity of substitution (CES) production functions also allows the model to approximate reality by placing limits on the substitutability between any two inputs [Brown (1967); Yotopoulos and Nugent (1976), ch4]. In general, however, the gain of realism from alternative production function forms comes at the cost of additional information requirements and computational difficulties.

There has also been a series of case studies which have indicated that the range of techniques available in Third World countries, although narrower than many economists have assumed, is still wider than that which some of the critics of the neo-classical model might suppose [Bhalla (1975); Jenkins (1975); Baer (1976); Stewart (1977); Ranis (1978)].

In a detailed and recent study [Pickett (1980)], whose object was to establish the range of sub-process technologies and to identify the

least cost case for a selected number of industrial sectors, it was found that:

[1] for each industry there was, indeed, a range of technically efficient technologies;

[2] in some industries the least cost option was also a labour intensive one;

[3] in most industries the profitability variation across technologies was narrower than for employment and investment costs, so that the economic penalty for choosing the employment maximising option might not be large; and

[4] even in a generically capital intensive industry (such as the production of ammonia and urea), employment could be increased by marginally less capital intensive (but also marginally less profitable) methods, so releasing funds which, in theory, could provide jobs elsewhere.

Although the above evidence would indicate the range of technologies available, it also serves to emphasise the anomaly of inappropriate choice of techniques in many Third World countries. Capital-intensive technologies are frequently chosen, despite the abundance of labour and the social desirability of reducing unemployment. The essential deficiencies of the neo-classical economic model and its inability to explain adequately why some techniques are chosen rather than others, thus remain.

Ultimately the "problematique" (that is, the kinds of questions which are posed and the answers which are sought) of this model is fundamentally mistaken. Rather than questioning how technologies might be

chosen according to appropriate factor proportions, the choice of technique needs to be examined within the broader framework of political economy. Subsequent sections in this chapter will indicate the way in which technological change is structured by the system of production and how the generation and choice of technology are largely determined by issues of power, control and interest.

Research and Development

It is important to distinguish between factor substitution and technological change. It is often assumed that a change in the relative price of factors of production acts as a spur to innovation, of economising the use of a factor which has become relatively expensive (10). But the relative factor price combinations in the Third World are unlikely to have a significant effect on the direction of technological change. Much more important are factors of political economy which are reflected in, for instance, the international imbalance of technological knowledge and power. The almost exclusive concentra-

(10) See for example Hicks (1932). This work triggered a complex debate in which, amongst others, W.E.G. Salter, C. Kennedy, W. Fellner, and P. Samuelson participated. Hicks argued: "The real reason for the predominance of labour-saving innovations must be sought in the fact that a change in the relative factor price will encourage a particular kind of invention, intended to economise in the use of the factor which has become dearer." p 124.
Salter questioned these assumptions, arguing that the individual firm is simply not interested in the particular factor-saving bias of technical improvement. He argued: "If one takes Hicks' argument to mean that new labour-saving technical designs will be obtained from the existing stock of knowledge, then this is nothing more than factor substitution. It is merely a semantic difference whether we call this kind of new technique 'invention' or 'substitution of capital for labour'. On the other hand, if the theory implies that the increase in the relative cost of labour will lead to a search for new knowledge which economises on this factor, then this theory is subject to serious objections, since the manufacturer is interested in reducing his total cost and not the specific cost of one or more factor." p 43 in Salter (1960).

tion of organised research and development (R&D) activities in the industrialised countries has a profound effect, not only on the nature of technologies available to the Third World, but also on the latter's ability to develop an indigenous technological capability.

Less than three per cent of the global R&D budget is spent by the Third World countries of Africa, Asia, and Latin America. Moreover, a handful of countries, such as Brazil, Mexico, India and South Korea, dominate this miniscule fraction, which means that most Third World countries have practically no R&D programmes. This is particularly so in Africa where, excluding the Republic of South Africa, only three countries - notably Libya and Nigeria (both relatively rich from oil reserves) and Ghana (which has been host to a large hydro-electric power and aluminium smelter complex installed by a consortium of multi-national companies) - employ 18,000 of the 25,000 qualified scientists and engineers in the continent (11). Of these, less than 1000 are employed in research and development activities: this reflects the fact that in most of the Third World, and particularly in Africa, there is virtually no indigenous scientific research capability, with most of the scientists and engineers being employed directly in the productive or service sectors.

Global expenditure on R&D now tops $150,000 million a year and employs some three million scientists and engineers [Norman (1979a)]. In spite of these huge sums, and the widely held perception that investment in R&D is an essential ingredient in securing the long-term prosperity of nations and businesses, there is scant public

(11) U.N. and UNESCO Statistical Yearbooks , and ILO, Yearbook of labour statistics ; see also OECD, Science resources newsletter , no 5, Summer 1980; and Wynne (1973).

knowledge of the programmes on which all this money is spent. Few governments publish accurate, up-to-date figures on the R&D conducted within their borders, and much of the world's scientific effort is deliberately cloaked in secrecy, either for military or commercial reasons.

The disparity between rich and poor countries in levels of expenditure on R&D is even more striking when outlays are expressed in per capita terms. In 1979, the United States spent roughly $200 for every person in the country, and several European nations spent similar amounts. In contrast, most Latin American nations spend less than $5 per person, and the poorer countries of Africa less than $1 per person. These disparities become even more apparent when it is noted, for example, that India spends on R&D only half of what the Ford Motor Company, and only a third of what General Motors, spend in any one year [Norman (1979b)]. These disparities mirror not only the many others between rich and poor countries, but also serve to reinforce patterns of power and exploitation. As long as the world's R&D capacity remains mostly concentrated in the industrialised countries, the focus will continue to be largely on the problems of the rich countries, and the Third World will remain dependent on imported, and often inappropriate, technology for its economic and social development.

The irrelevance of much of the world's R&D to the needs of Third World countries is most obvious in the disproportionate amounts spent on military R&D; this amounts to roughly one quarter of the total global R&D expenditure and, in countries like the United States, Britain and the Soviet Union, absorbs about half their government's R&D outlay. Basic research (carried out chiefly in universities in the

Western world and by specialised institutes of the Academy of Sciences in the Soviet Union) and space research, absorb a further quarter of global R&D expenditure. Research areas such as health and agriculture are also geared primarily to the needs of rich countries. In the United States alone, about £670 million was spent in 1979 in an attempt to raise the productivity of American farmers. This sum far exceeds the agricultural R&D of all the Third World countries and the international agricultural institutes put together (12).

These problems are further compounded by the observation that existing scientific and technical activities in the Third World tend to have a very limited role in relation to the production system, which relies heavily on the importation of foreign technology. Furthermore, the limited part they play is heavily oriented towards the kinds of technology which already predominate in the economic system. Thus what little R&D does take place in the Third World is generally divorced from domestic needs.

This phenomenon has been termed the "marginalisation of science" [Herrera (1973)]. Local industrialisation is influenced by an income distribution which is skewed in favour of the urban elite; they dominate the consumer goods markets, which then tend to mirror those in industrialised countries. As these technologies already exist, foreign technology tends to act as a substitute for local technology. Foreign technology is generally regarded as superior and more reliable, even where local research and development capabilities exist. So local science and R&D activities become alienated or "marginalised" from production (13). Indigenous research institutions tend to

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(12) Norman (1979b), p 281. For R&D statistics in the U.S.A. see: National Science Foundation (1981).
(13) This is an aspect of the structuralist theory of dependence,

orientate their work towards the kinds of problem areas which interest the scientific establishments in the industrialised countries. The small deployment of global R&D expenditure in the Third World makes the frequent allocation of very scarce budgetary and human resources to essentially irrelevant activities, and reward and value systems, particularly painful. This process has often been reinforced by the Western training and education of many of the scientists and engineers in the Third World. Scientific activities in these countries tend to be a form of consumption rather than investment.

The literature abounds with recommendations and policy proposals for building up indigenous R&D capacity in the Third World (14). Unfortunately, many of these proposals incorporate ethnocentric assumptions which obscure the historical reality of the generation or acquisition of technologies in these countries. But the uncritical notion, prevalent in the sixties, that the overcoming of underdevelopment in the Third World required the creation of research institutions and scientific endeavour similar to those found in the industrialised countries, has begun to be superseded by a more analytic and sceptical approach which attempts to understand the relationship between science, technology and development in the Third World [Sagasti (1978)].

The observation that the rich countries have strong science establishments has led, in modern times, to the popular perception of

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see, for example, Furtado (1967).

(14) UNESCO (1970), (1974); Nelson (1974); Moravcsik (1975); Sagasti (1978); Fischer (1979); Parthasarathi (1979); see also the STPI research programme of the International Development Research Centre, Ottawa. The interesting case of INTINTEC in Peru is described by Flit (1979).

science and development as being inextricably tied. Conventional wisdom on how science yields development is usually presented in the following way: scientific knowledge produced in research activities is translated into technical innovations, which, when applied to the system of production, increase the productivity of factor inputs, and which, in turn, result in the growth of real income, and thus economic development. But this intuitive and causal relationship is, in practice, difficult to substantiate.

The acknowledgement of the existence of a link between science and technology is vacuous without the knowledge of the strength of this link, of how specific scientific discoveries lead to technical innovations, and of any feedback mechanisms between technological development and the growth of science. The popular perception of science and technology has long been that science is concerned with the pursuit of abstract and "pure" knowledge of the universe, whereas technology may be regarded as "applied science". Pure science consists of theoretical constructs ordered towards knowledge, and technology of constructs ordered towards practice and concrete applications. In recent years, however, this understanding has given way to an interactive model of science and technology where the two are seen to be enmeshed in a symbiotic relationship [de S. Price (1969)]. This shift from an hierarchical conception of science and technology has followed, firstly, from the recognition that they are forms of culture; new science develops predominantly from old science and new technology from old technology. Barry Barnes argues:

> "In the case of science, the tendency to relate new findings solely to nature, and to give little explicit stress to received knowledge, whether existing science or inputs from technology, constituted an obstacle which has only recently been overcome. In the case of technology, undue concern with the role of science in innovation for a long

> time stifled interest in the far more important role of existing technology" [Barnes (1982), p168].

Secondly, it has come to be recognised that scientific discoveries have no "in-built" logical implications, which determine specific applications. Barnes continues:

> "Cognitively, there is no fundamental distinction to be drawn between the creation of scientific theory and its subsequent application. Just as the one is the imaginative development and purposive reordering of existing knowledge, so too is the other. And also, in just the same way, is the exploitation of technological innovation in the context of science" [ibid., pp 168,169].

It has also become exceedingly difficult, within the industrialised countries, to construct clear divisions between science and technology. Major advances in science have in the past often been responses to the needs of production, and today, in many respects, science itself has become industrialised [Ravetz (1971)]. The practice of science has become both increasingly costly and important, and R&D activities have progressively shifted under the control of industrial and government laboratories [Jewkes, Sawers and Stillerman (1959); Mansfield (1971); Spiegel-Rosing and de S. Price (1977)]. Science has also assumed great political importance: the success and vigour of scientific research, and the effectiveness of technological developments, have for many become indicators of the quality of a nation's life. The expense and importance of science are reflected in the extent to which major decisions concerning its development are being taken by the state and by industry. Industry with its concern with the production and sale of goods and services, and the state in its protection of industry and concern with defence, growth, and political power, exercise extensive control over the resources which are allocated to science and technology in R&D activities. Science now often consists of highly capital intensive research and the use of

complicated and sophisticated technology. The interpenetration of science, technology and government, with the consequent blurring of boundaries between technology and "pure" science, has meant that the links between science and social benefits are no longer perceived as being obvious and this, in times of economic stringency, has led to the relative decline in government support for scientific research.

Although there are perhaps obvious parallels between figures indicating official expenditure on organised R&D activities, and the level of technological and industrial development in different countries, these data should not obscure the complex relationship between R&D and technological innovation at the level of production. It is far from clear that technological change involves merely the production of knowledge in R&D, followed by the diffusion of research results and knowledge to the production system, and ultimately the consumption of knowledge in technical innovations. Rather, the evidence presented below would indicate that these relationships are complex and that there are important and dynamic feedback mechanisms from the system of production, technical innovations, learning processes, and the extension of knowledge.

Furthermore, although studies have indicated the importance of technological change for economic growth in the rich countries, caution should be exercised in the uncritical application of such conclusions to the Third World countries. Statistical studies have shown that the growth of capital accounts for less than a quarter of Gross Domestic Product (GDP) growth in the rich countries, with improved resource allocation and technological change typically accounting for half of the total economic growth. However, in Third World countries capital accumulation has typically been shown to account for 40 to 50

per cent of total growth [Chenery (1971)].

The international imbalance in technological capabilities has important implications for the acquisition or development of new technologies by Third World countries, which are faced with the problem of, firstly, the transfer of technologies, mainly from the advanced capitalist countries, and, secondly, the need to generate indigenous technological capabilities.

International Trade and Technological Change

The fact that the Third World countries derive most of their technologies from the industrialised countries has implications for the traditional theories concerning international trade and comparative advantage (15). These implications further undermine the neo-classical assumptions of the narrow interpretation of appropriate technology, of efficient utilisation of available factor endowments.

Following the classical theories of Ricardo and Mill, economists have subsequently been concerned to account for comparative advantages in the context of the expansion of the capitalist system of production at the world level and the incorporation of Third World countries into the international division of labour.

Neo-classical trade models have taken the international differences in resource endowments to be the main explanatory factor underlying trade flows [Heckscher (1919); Ohlin (1933); Samuelson (1948)]. However, it has been pointed out that the possession of highly developed

(15) For a critical review of the literature see Smith and Toye (1979); see also Little, Scitovsky and Scott (1970); and Helleiner (1972).

technological capabilities constitutes an additional source of comparative advantage above and beyond those conferred by the physical environment and by the relative endowment of capital and labour resources [Johnson (1975)].

Posner introduced a model which incorporates technologically derived advantages into a dynamic theory of international trade, demonstrating how technological innovation could create a comparative advantage which had not previously existed [Posner (1961)]. Trade occurs during the imitation time lag. Although the initial advantage would gradually be eroded by the spread of the new technique through imitation, the lag may be artificially lengthened by the use of patents and licences. However, the theory fails to explain why technological innovations occur in some countries rather than others. Even when R&D activities within firms are examined, one is still left with the unexplained decisions to invest resources in research in some firms and not in others.

The "product life cycle" theories attempted to answer some of these questions [Vernon (1966); Hirsch (1967)]. According to Vernon, the cost of production is not initially a major factor, as the innovator has an initial monopoly and the demand for the new product is likely to be relatively inelastic. The development of new products requires close interaction between the innovating enterprises and the suppliers of production equipment and machinery. Thus the innovation is likely to take place in the country for whose market it is designed. After the introduction of a new product, international trade is possible because of the technology gap. However, as demand expands in other countries, there will be a tendency to transfer its production to lower cost locations. With product standardisation, product

competition increases the elasticity of demand, and the comparative advantages of Third World countries becomes more important.

These theories, however, do little to explain how technology and skill monopolies occur and how they are sustained or eroded. They remain at the level of descriptions of possible sequences, rather than of explanatory theory.

In practice, neo-classical theories of international trade have been used as justifications for the pursuit of free trade policies in the context of the expansion of the capitalist system of production. According to this model, each country would make efficient use of its productive resources through an international division of labour arising out of the production and export of commodities which fully reflect the abundance or scarcity of local production factors. The world market would be, supposedly, a complex of reciprocally advantageous trade deals from which all countries would benefit. These assumptions underlie the arguments of the narrow view of appropriate technology which has been adopted by many of the major aid agencies.

However, these postulates do not accord with the historically observed facts on the expansion of trade. While it cannot be ignored that comparative costs play an important role in international trade, neither can it be ignored that trade flows have been imposed and controlled by the industrialised nations to their own benefit (16). The international expansion of capitalism has invariably led to unequal development and to an absolute transfer of surplus from the Third World countries to the industrialised nations [Emmanuel (1972); Amin

(16) These structurally biased gains from trade have been studied in particular by Prebisch and the structuralist school of thought. See Prebisch (1959).

(1974)]. The capacity to create comparative advantage as a result of technical innovations, and to transfer these innovations rapidly, is used to maintain and create new opportunities to enhance monopolistic control. Third World countries, lacking such technological capabilities, have had little alternative but to be largely exporters of primary products. However, we should guard against the crude identification of primary production with poor countries and industrial and manufacturing production with rich countries. There is growing evidence that the transfer of technology has allowed limited opportunities for technical learning, the development of indigenous technical innovative capabilities, and even the export of manufactures (17).

Structuralist economic development theory (with which the influential U.N. Economic Commission for Latin America (ECLA/CEPAL) has been closely identified) has prompted the formulation of policies designed to control the transfer of technology. Most of these policies rely on institutional devices of various kinds. Several organisations (such as the Andean Pact and UNCTAD) have attempted to introduce policy instruments, with varying degrees of success [Jeffries (1977)]. These efforts have served to highlight the problems of national registers for the transfer of technology; restrictions on foreign ownership of industrial investments; restrictions on transfer pricing and the repatriation of profits; trademarks, and attempts at controlling the commercialisation of technology; and the vulnerability of these programmes to political change [Manser and Webley (1980)].

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(17) See the section on Indigenous Technological Capability below.

Technological Innovation

Although Third World countries acquire most of their technology from abroad, an increasing number of these countries are beginning to develop their own technological capabilities, albeit within certain limits and constraints. An extensive literature on technological change in the industrialised countries has dealt with questions of technological innovation as one of the key processes in building indigenous technological capability.

Within the neo-classical economic tradition, Joseph Schumpeter has had a significant role in the development of theory concerning technological change. He distinguished between invention, innovation, and imitation. Simply stated, inventions are discoveries. Innovations, in contrast, are inventions which in the hands of skilful entrepreneurs are made economically viable. Much of his work focussed on the instability of capitalism and on the central role that innovation plays in creating such instability [Schumpeter (1934),(1961),(1964)]. For him:

> "what dominates the picture of capitalistic life and is more than anything else responsible for our impression of a prevalence of decreasing cost, causing disequilibria, cut-throat competition and so on, is innovation, the intrusion into the system of new production functions which increasingly shift existing cost curves" (18).

Schumpeter argued that for a firm to retain its profits it has to innovate. Innovations entail the construction of new plant and equipment, or the rebuilding of old plant, and innovations are always

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(18) Quoted in International Development Research Centre (1980), p 12. It is interesting to note that although Schumpeter was confident that the disturbances brought about by technological innovations would not destroy what he considered to be the inherent instability of the capitalist system, he thought that its social implications would lead to its eventual replacement. See Schumpeter (1928).

associated with the rise to leadership of new men. He places a great deal of emphasis on leadership, which he distinguishes from mere ownership of the productive enterprise [Schumpeter (1964), pp 66-69].

By linking the role of the entrepreneur, the process of innovation, and the evolution of capitalism, Schumpeter was able to advance neo-classical economic understanding of technological change from a static analysis of production functions. However, many features of his thought are misleading. Unfortunately, much of the current economic thinking on the process of technological innovation derives from the Schumpeterian heritage with its disjunction between invention, innovation and imitation. Nathan Rosenberg, in particular, has criticised this conception as an artificial separation between innovation and other linked activities which constitute part of the historical process of the generation of new technologies (19). The concepts employed do not explicitly recognise the role of patterns of events at the technological level, and thinking about innovations is confined to features and characteristics which are likely to be true only of major innovations. Discontinuities are disproportionately emphasised, such as in famous discoveries and inventions, and continuities in the innovation process are neglected. Excessive significance is also attached to the early stages in the process of invention, and later but crucial stages, such as technological development, are neglected.

Economics in general reveals an hierarchical conception of different forms of knowledge. Excessive importance is given to the role of

(19) Rosenberg (1976). This book also contains a critique of the neo-classical economic theory of the choice of technique, along much the same lines as Stewart (1977).

abstract and scientific knowledge, and insufficient importance is given to more technological or engineering knowledge. Technical change involves dealing with innumerable small increments to the stock of knowledge. Technical knowledge deals not with the general or universal but with the specific and the particular. Rosenberg sees much of the present thinking on the process of technological change as an intellectual barrier to a better understanding of the nature of economic growth.

His critique extends to the heart of neo-classical economic theory, which suggests that the output of an economy, at any given time, is a function of factor inputs, with the relationship described by a production function. He questions these assumptions and asserts that economic growth is not so much attributable to changes in capital and labour inputs, as to technological change (20). This involves not quantitative changes in inputs, but numerous qualitative alterations in technical skills, knowledge, organisational and managerial abilities, levels of economic aspiration, and the capacity for innovation. He sees the source of these improvements as being participation in economic activity itself. The quality of human factors of production is decisively affected in a variety of ways by the nature of its production and consumption activities, which in turn appear to change in a fairly systematic fashion as a result of economic development. Economic growth is in many respects a learning process where new skills, aptitudes and aspirations are acquired.

An understanding is needed of these feedback phenomena: this is not provided by neo-classical economics, which is interested, primarily,

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(20) See the pioneering work of Solow (1957).

in the short term, and in examining the conditions under which output from a given volume of resources will be maximised.

Recent years have seen the publication of a number of studies which have departed from the Schumpeterian conception of innovation by concentrating on such areas as processes of technological learning; the importance of "minor" innovations, involving changes in technological or engineering knowledge; and the diffusion process, which is viewed as a process of cumulative improvement and adaptation of technologies rather than the mere adoption of an innovation by an increasing number of firms (21).

Implicit in many of these studies is a rejection of the neo-classical model, with its artificial and confusing distinction between technological change (defined as an overall shift in the production function) and factor substitution (understood as movement along the function). Instead, it is asserted that "practically any non-trivial change in a process or product, if there has been no previous experience, is an innovation" [Nelson and Winter (1977), p 48].

Most studies have been carried out at the level of the firm, and have dealt with such questions as the strategies adopted towards industrial innovation; the nature and scope of opportunities open to the firm for enhancing its technology as part of its search for efficiency and profits; the size of the firm; the nature and degree of market competition that the firm is facing; and the general economic

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(21) For extensive reviews of the literature see: Kennedy and Thirwall (1972); Freeman (1974); Nasbeth and Ray (1974); Kamien and Schwartz (1975); Kelly and Kranzberg (1978). Other important works are Stiglitz and Atkinson (1969); Nordhaus (1973); Binswagner (1974); David (1975); Nelson and Winter (1977); Kay (1979).

environment in which the firm is working.

An interesting conclusion from one survey of the literature has been that there is little evidence to support the hypothesis that large firms or monopolistic industries, with their greater resources for R&D expenditure, are necessarily more dynamic and progressive as regards technological change.

> "After a certain thresh-hold size there is even evidence that R&D activity and the number of patents issued appear to increase less than proportionately with size. Moreover there is some evidence that it is not always the largest firms that innovate the quickest despite their presumably more favourable access to resources. Large firms by no means have a monopoly on fundamental change either. Major technological breakthroughs come from a variety of sources" [Kennedy and Thirwall (1972), p 61].

However, most of this work has dealt with the industrialised countries. Empirical research and interpretative theory concerning technical innovations in Third World countries is still in its infancy.

Indigenous Technological Capability in Third World Countries

Recently, there have been a number of detailed micro-economic studies on technological change in Third World countries. Jorge Katz has co-ordinated an Inter-American Development Bank and Economic Commission for Latin America (IDB/ECLA) research programme in science and technology, focusing primarily on domestic technology creation in various branches of manufacturing in different Latin American countries (22). Katz criticises the conventional assumption that there is a negative relationship between importing technology from abroad

(22) More than 30 working monographs have been published by the IDB/ECLA Research Programme in Science and Technology, Oficina de la CEPAL en Buenos Aires, Callao 67 - Piso 3 , 1022 Buenos Aires, Argentina. See in particular Katz (1978).

and generating it locally (23). He argues that "inadequacies" in imported technology generate a potential demand for new complementary adaptive technological knowledge, which may allow a relatively more efficient use of the imported technological "blue-prints" within changed circumstances and different engineering and economic environments. This need for adaptation may have to do with:

[1] the type, quality and cost of the materials locally available;

[2] the relative factor price in the local market (sic);

[3] the scale of the plant;

[4] the climatic, geographical and environmental conditions in which the product and/or process are used locally;

[5] specific characteristics and requirements of the local consumer with regard to quality, maintenance and servicing;

[6] the nature of the by-products arising from the product manufactured or the process employed; and

[7] differences in the legal and institutional framework in the labour field, or in the local market structure.

It is clear that local innovations to overcome the inadequacies in imported technologies will result in a technological package with altered blue-prints and engineering designs, which will take either an "embodied" form in changed machinery or end products, or a "disembodied" form in terms of engineering procedures, management or

(23) Katz (1978), p 10. A number of studies have demonstrated the complementarity between imported technology and local generation of technological knowledge in the Japanese case. See for example Oshima (1973).

organisational structures. This adaptive technological activity gives rise to the eventual appearance of a new product or process capable of earning profits when sold in third markets [Lall (1978); Katz (1978), pp 29-36].

Katz recognises that these demands for adaptation might not necessarily be satisfied. Adaptations and improvements require the availability of local skilled labour capable of developing incremental technological knowledge. He sees the lack of skilled labour as a structural feature that can only be modified over the long term, since the creation and maintenance of professional and technical schools assumes an investment programme which comes to fruition only over decades.

Other findings from this study refute the widely accepted view following the work of Salter that:

> "technological change [is] any modification in the production technique of a given product, put into practice by a specific plant, with the aim of reducing its unit production cost" [Hollander (1965), p23; Salter (1960)].

The evidence indicates instead that cost reduction is only one, and not necessarily the most important objective of technological change which is also determined by attempts at quality improvement, diversification of the output mix, increase of the physical output of particular machinery, and replacement of imported raw materials and spare parts by local substitution.

There are two important features in this series of IDB/ECLA studies. One concerns the empirical evidence which demonstrates a significant domestic innovative capability within the manufacturing sectors in some of the Third World countries covered by the research programme. This has had an impact on the overall factor productivity at plant

level within these countries, and also on their export capacity. The other concerns the identification of minor adaptations to imported technology, which cumulatively constitutes the major source of domestic technological innovation (24).

However, the explanatory framework presented by Katz gives rise to a number of difficulties. Not only is an element of technological determinism incorporated into the model, but problems of power and the control of knowledge are ignored (25). Katz attempts to explain the growth of indigenous manufacturing productivity by arguing that the "inadequacies" of imported technology create the demand for adaptations, and that these, in turn, require skilled labour to make the creation of domestic technological knowledge feasible. This scheme abstracts technology from the system of production, and, thus, evades all the important questions as to who controls the nature and direction of technological change, and the generation of knowledge. Even if it is accepted that there are features of technology which, when transferred to a new environment, require adaptations, it is legitimate to ask who controls the responses to these demands and why adaptations take on a particular form.

These issues of power, control, and interests are important if one is to understand and explain the emergence of indigenous technical innovative capability in Third World countries, in the face of effective control and concentration of the development of scientific and technical knowledge mainly by transnational corporations. It would seem reasonable to ask what the limits are to this indigenous development,

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(24) cf. von Mitschke-Collande's (1980) study of the engineering sector in Tanzania.
(25) See the later section on technological determinism.

and how the interests of those who control indigenous technological development are, perhaps, aligned with international capital, which in all Third World countries is still the major source of new technologies. These questions, which Katz's study effectively ignores, will be discussed at greater length in later sections of this chapter.

In another study, Lall (1978) distinguishes between six levels of learning processes:

[1] simple learning by doing - increasing worker efficiency through familiarity;

[2] learning by minor adaptation - small changes made on the shop floor by engineers and managers;

[3] learning by design - replication of imported machinery;

[4] learning by improved design - modification for different conditions;

[5] learning by setting up whole local productivity systems - thus creating consultancy and turnkey capacity; and

[6] learning by designing new processes or products - through R&D departments or research institutions, which may lead to important "minor" innovations.

Thus, Lall also dwells on the importance of utilizing imported technology, as a source of learning, to build up local skills which can be translated into adaptations and technological innovations. This is something which happens primarily in the course of production, although Lall concludes with policy recommendations to promote local

technology by investing in basic science and research, the encouragement of in-house R&D, the judicious restriction of access to foreign technology, and careful (not excessive) protection against both imports and foreign enterprises to cover the phase of heavy learning costs and skill formation in infant industries.

It has been pointed out that the development of local technological capability aids the more selective and efficient transfer of foreign technology. Technology is a potential source of monopoly, and technology-owning enterprises in advanced capitalist countries exploit oligopolistic advantages in Third World countries. Terms of technology transfer are, to a certain extent, negotiable if a company particularly wants to operate in a specific country. But, the recipient enterprises and governments are in inherently weak bargaining positions, if only because they cannot possibly know all about what they are buying until they have bought it. They lack technical and commercial information, particularly on alternatives. So transnational corporations obtain high returns on investments and maintain a degree of control over the nature of the investment, price levels, quantities produced, suppliers, purchases, and the allocation of profits. Joint ventures between local firms or national governments and subsidiaries of transnational corporations are often subject to the constraints of major decisions still being taken in head offices abroad. In addition, locally owned firms are often restricted through licensing and patent agreements [Cooper (1973); Kaplinsky (1976); Vaitsos (1976)].

It is impossible to choose imported technology wisely, to bargain effectively, to unravel technology from investment packages, to judge proposals, and to adapt imported technology to the concrete needs of

a country, unless a national technological capacity exists.

Recent years have seen a growing literature which recognises the importance of creating an indigenous technological capability (ITC) in Third World countries. For example, Gustav Ranis writes:

> "to the extent that any one dimension is key to the successful application of technology in the development context, it is the quality of indigenous technological activity that counts the most" [Ranis (1982), p1].

In stressing the importance of ITC, most authors distinguish between various types of technological capabilities:

[1] the capability to select technologies appropriate to local needs and conditions, efficiently and on favourable terms [Cooper and Maxwell (1980); Dahlman and Cortez (1982); Desai (1982); Ranis (1982); Stewart (1982)];

[2] the capability to master imported technologies, and to operate and maintain productive processes successfully [Dahlman (1982); Desai (1982); Stewart (1982)];

[3] the capability to duplicate imported technologies [Desai (1982)];

[4] the capability to adapt and improve technologies to meet local conditions and needs [Dahlman (1982); Katz (1978); Ranis (1982); Stewart (1982)];

[5] the capability to introduce a degree of novelty in the production of products or processes [Desai (1982); Fransman (1982)];

[6] the capability to develop new technological knowledge [Dahlman (1982); Langdon (1982)]; and

[7] the capability to channel and diffuse new technological knowledge across agricultural and industrial establishments [Ranis (1982)].

Clearly, these capabilities are neither conceptually nor empirically independent. For example, the capability to adapt and improve technologies implies a capability to introduce a degree of novelty in the production process, which might also be essential for the efficient selection of imported technologies.

It has been recognised that it is difficult to define ITC independently of an actually demonstrated occurrence of local technological activity, and, thus, distinguishing between different technological capabilities does have some practical importance. Unfortunately, this recognition has all too often led to an almost exclusive preoccupation with narrowly defined empirical data and an insistence that the stock of indigenous technological capability can only be identified with its actual use [Ranis (1982), p 3]. The effect of this approach is to ignore questions of political economy, which in practice govern and, on occasion, inhibit the expression of ITC. Stewart recognises this point:

> "In trying to explain why some societies innovate efficiently and others do not, the fundamental and underlying explanation often seems to lie in the realm of history and interests, rather than the particular policies" [Stewart (1982), p 9].

This is one of the issues with which the case study, in subsequent chapters of this thesis, is concerned.

Policies are the reflection of these deeper influences. While there might be a measure of concurrence concerning the importance of the different aspects of ITC, listed above, there is less agreement as to

the policies appropriate to generating ITC. Discussion of policy areas relevant to the creation of ITC may be divided into two main approaches: educational, training and institutional reforms, and economic and industrial policy measures (26). The former revolve around issues such as educational and skill qualifications for "blue-collar innovation", and the links between science and technology policy, R&D institutions, and the productive sector. Economic and industrialisation policy measures include import substitution, industry protection, export promotion, the creation of a capital goods sector, the selective importation of foreign technology, unpackaging technology purchases, controls on products and brand names, promoting local linkages, controlling the degree of competition and promoting an environment of continuous industrial expansion, where technological change and learning are more likely. It has been pointed out that:

> "any successful industrial expansion is likely to be associated with some local technological activity, because adaptation to local conditions is part of the process of successful industrial activity" [Stewart (1982), p 3].

It is unfortunate that little research has been undertaken into the problem of the generation and innovation of technologies within the context of rural development, a vital aspect of the problems facing most Third World countries (27). The appropriate technology literature contains many descriptive accounts of the introduction of new technologies into rural areas, but little serious consideration is

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(26) These two approaches have been combined in the innovative work of van Rensberg in Botswana, where education has been linked with production in the establishment of a network of school/production brigades [van Rensberg (1982)].

(27) Among the few studies which can be identified are Dean (1972), Dickinson (1972; 1975), Evenson (1975), Sigurdson (1977), Dewalt (1978), Holtermann (1979), Reddy (1979), and Herrera (1981).

given to the problem of innovation and of how indigenous technical capability might be developed [e.g. Dunn (1978)].

Herrera (1981) has proposed a methodology for the endogenous generation of technologies in rural areas, which employs a set of paradigms appropriate to local conditions in Third World countries. He stresses the need to link the development of technologies to the overall direction of economic and social development, which is desired by the mass of the people. For him, the term appropriate technology has no meaning unless located in the frame of reference of a clearly defined type of society. The specific type of technology a country or region should adopt cannot be determined by a priori prescription; it should emerge from the very process of generating it.

Two of the essential elements of the proposed methodology are the utilisation of local knowledge and the participation of local people in the whole process. Local empirical knowledge can be used profitably as the local population have had to develop, through long experience, methods and technologies of production, compatible with the physical environment, as a condition for survival. The recognition of the importance of people's participation in development programmes is not only based on an ideological position - the admission that people have a right to participate in their own destinies - but also, and mainly, on pragmatic and operational considerations. It has been shown time and again that many development projects have failed because the opinions and ambitions of the people involved were not taken sufficiently into account. Also, the participation of the local population in the process of creation of the technologies will contribute to the generation of knowledge and skills required for

their use and production. Herrera describes five main stages in the proposed methodology:

[1] The general socio-economic characteristics of the selected region should be evaluated, in order to understand the dynamic social elements in which a technological problem is always immersed.

[2] The functions that the required technology is expected to fulfill, should be determined.

[3] The solutions, which the local community have traditionally used, should be analysed.

[4] A general survey of the natural resources of the area should be carried out.

[5] With the information gathered in the previous steps, a set of assumptions or paradigms will be derived, which will be the frame of reference for the final step of developing the required technology.

The set of assumptions, which will contain scientific, technological, environmental, economic, social, psychological and anthropological information, will define a "technological space", which is the set of requirements and constraints which the technology has to satisfy.

Herrera emphasises, finally, that the methodology of endogenous generation of technology refers to the ~~the~~ process through which the characteristics, which the technology should have, are determined. As such, "endogenous" refers specifically to the process of definition, and not necessarily to the technology itself, which can be

imported, provided it is "appropriate". Thus, Herrera's propositions regarding the generation of technologies in rural areas leaves unanswered many of the interesting problems, raised in the preceding sections, regarding the actual activity of technology creation and the generation of the requisite technological capability. His methodology remains at an abstract level, and, although he correctly links the development of technology to the overall development process, his proposals to Third World countries to devise alternative research and development methodologies ignores the inequitable distribution of resources and power, which make these changes unlikely. Herrera's work, however, begins to offer a broader interpretation of appropriate technology, which will be examined below in greater detail.

Much of the preceding review of the literature has focussed on the processes of technological change within the context of economic development. The discussion has been set against the general background of the problem of appropriate technology choices for Third World countries. As we have seen, the narrow view of the concept of appropriate technology is based on the neo-classical economic theory of the choice of technique. Criticisms indicated the way in which the model presents a misleading and incorrect account of the mechanisms and determinants of this choice, as well as an inadequate treatment of the problem of technological change and innovation. The preceding sections have dealt at some length with the questions of how the concentration of R&D and scientific and technical knowledge in the industrialised countries circumscribes the availability and generation of technologies in the Third World, what the relationships between science, technology, innovation and development are, and how

the development of an indigenous technological capability might be facilitated. These issues not infrequently lead to the policy dilemma for Third World countries being posed as a choice between either the transfer of technologies from the industrialised countries, or the development of technological self reliance. As the preceding section has indicated, the two are interrelated and the issues are merely obscured if it is argued that the former strategy should be rejected for the latter - as did, for example, the Monrovian declaration of African states [Economic Commission for Africa (1980)]. Indeed, the development of indigenous technical innovative capability can be facilitated by the selective adaptation of foreign technology imports, through the different learning and innovative processes which have been described. Any theory of appropriate technology must ultimately face these questions of how indigenous technological capability might be developed.

THE BROAD INTERPRETATION

In contrast to the narrow interpretation of the concept of appropriate technology predicated upon neo-classical economic assumptions, the broad interpretation introduces additional social, cultural and often environmental, considerations. The criterion characterising the broad interpretation - namely, that appropriate technologies are those which contribute to specific development objectives - has been the subject of a growing body of literature within development theory, particularly that which has dealt with the notion of "basic needs".

Basic Needs and the Choice of Technology

For many years development has, in practice, been seen to be synonymous with growth, where the goal of development was to make possible a cumulative and lasting increase in the production of goods and services. However, only the most doctrinaire of development theorists and economic policy advisors would now seek growth at any price. The recognition of the serious problems of income disparities and growing poverty in many Third World countries has led to an emphasis on development policies which promote redistribution as well as growth [Griffin and Khan (1978)].

In 1974 the World Bank, in conjunction with the Institute of Development Studies at the University of Sussex, published the study Redistribution with Growth, which in recent years has formed the basic philosophy of the bank [Chenery et al (1974)]. The realisation that aggregate economic growth had done little for the poor majority in the Third World found an even greater and more direct expression in the formulation by the International Labour Organisation (ILO) of the concept of Basic Needs, which was articulated at the World Employment Conference in Geneva [ILO (1976)]. The goals of development were to be directed towards the elimination of poverty within a short period of time through the satisfaction of basic human needs which included:

[1] the satisfaction of basic requirements of families for private consumption such as food, shelter and clothing; and

[2] access to essential services such as safe drinking water, sanitation, health and educational facilities.

Appropriate technologies would be those aimed at meeting these basic

needs through both employment creation and the production of commodities and infrastructure for the poor (28). With the great majority of the poor residing in the rural areas in Third World countries, appropriate technologies have been seen to have particular applicability for rural development: they have, in general, been proposed as labour-intensive, low cost alternatives to modern sector technologies, with the latter's privileged access to scarce capital and skills [Singer (1977a, 1977b); Bhalla (1979)].

This development strategy has been criticised by, amongst others, Ajit Singh, who fears that it might discourage industrial development and the long term restructuring of Third World economies [Singh (1979)]. Singh sees industrialisation as a necessary condition for rising productivity and standards of living. He argues that the current emphasis on basic needs and appropriate technologies by the aid and donor agencies of the advanced capitalist countries, is largely attributable to apprehension about the growing competitiveness of some industrial sectors of Third World countries. He thus does not accept the proposition that these countries should concentrate on small scale industry and labour intensive projects, as such a notion of comparative advantage reflects no more than the existing international division of labour, which is itself a product of a century or more of colonial domination. Singh sees the "basic needs" and "appropriate technology" strategies as a reformulation of the discredited doctrine of static comparative advantage, disguised now as a stated concern for the poor. The strategy is thus ideological,

(28) The ILO claim to have been the first to use the term "appropriate technology" [ILO (1971)]. One of the first conferences on appropriate technology was the International Workshop: Development and Dissemination of Appropriate Technologies in Rural Areas, held at Kumasi in Ghana, 17-28 July, 1972.

and obscures the real interests of the advanced capitalist countries.

The basic needs concept has given rise to many unresolved problems, such as: the size of national and international resources required to meet basic needs targets, and how these resources are to be generated; the relationship between basic needs, poverty and inequality of income distribution; political questions concerning the commitment of those in power to allocate resources to the meeting of basic needs; and the problems of measuring basic needs in different societies.

In spite of these objections, Singh argues that there can still be an important interrelationship between the meeting of basic needs, industrialisation and accelerated structural change. He asserts that there need be no conflict between meeting basic needs and accelerated industrialisation, to which importance is attached, by many Third World countries, for the restructuring of the world economy and the establishing of the New International Economic Order (NIEO). To meet the basic needs of the poor in the Third World in a sustainable way it is essential, he argues, to raise the rate of economic growth in these countries by transforming their productive structures. This requires the accelerated development of modern manufacturing industry, including the establishment of a capital goods sector. At the same time, as the rate of growth of demand is likely to be an increasingly important constraint in the future, a properly conceived basic needs type approach which involves a larger and steadier transfer of untied resources from rich countries, should, in general, positively aid industrialisation in the Third World.

According to Singh, unless small scale and labour intensive projects

are integrated into an overall development plan of industrialisation and structural change, they are unlikely to succeed in meeting basic needs in the long term. Accelerated industrialisation and a redistributive fiscal policy must be the two pillars of any well conceived basic needs programme.

But Singh's analysis ignores some persistent and important problems:

[1] He advocates accelerated industrialisation in Third World countries, without anywhere enlarging on what form this industrialisation should take. It would seem reasonable to assume that what Singh means by this industrialisation is the capital-intensive kind common in industrialised countries. Implicit in the argument, therefore, is the rather simplistic assumption that industrialised countries are rich because they use capital-intensive technologies. But these countries use them <u>because</u> they are rich. The fact that capital-intensive technologies are generally efficient is largely a result of the uneven distribution of technological power and the enormous concentration of R&D expenditure and effort found in the industrialised countries. Any policy prescription for rapid industrialisation has to take into account these problems of power and the control of technical knowledge, of how the transfer of technology might be regulated to the benefit of the recipient country, and of how an indigenous technical innovative capability might emerge, which is able to direct technological development along new, different, and perhaps more appropriate paths.

[2] He attaches little importance to the uneven impact of rapid industrialisation, and the extent to which it leaves the prob-

lems of rural poverty and employment largely unaltered (and perhaps even exacerbates them by diverting scarce resources such as capital and skills to the favoured modern sector). The economic and industrial growth of the so-called newly industrialised countries (NICs) such as India, Brazil and Mexico, when measured by conventional indicators, might seem promising - but the pressing problems of their growing, rural poor remain largely untackled. It is not very helpful to talk of redistributive fiscal policies when the evidence of all such attempts points to their singular lack of success in the face of the class interests of those in power.

[3] He does not seem to appreciate the manner in which the production system structures class interests, nor how the transfer of advanced capitalist country technologies acts to reinforce positions of power and control. Instead, Singh treats Third World countries in an undifferentiated manner: the benefits of rapid industrialisation supposedly accrue to the country as a whole, rather than merely to an elite minority .

Nevertheless, Singh's analysis does serve to emphasise two important issues:

[1] the necessity for any appropriate technology and basic needs strategy to come to terms with the problem of meeting these needs in the long run in a self-sustainable manner; and

[2] the ideological character of the appropriate technology and basic needs philosophy. This is an issue which will be explored later in this thesis in the context of the way the aid process structures both the nature and the choice of technologies

utilised in Third World countries, particularly within rural development projects.

Alternative Technology

Another variant of the broad interpretation is the concept of "alternative technology". This incorporates social, cultural and environmental criteria, in addition to economic factors, in judging its appropriateness for meeting particular development goals. The conceptual and social origins of the broad view arise as much from an awareness of the problems of technology transfer, as from a radical critique by the environmental movement of advanced Western industrial technology. Debate among development theorists and national policy advisors on the wisdom of unchecked technology transfers to Third World countries has been paralleled by debates in the industrialised countries on the limits to growth, the ecological and energy crises, and the need for alternative technologies which utilise renewable resources and allow community participation and control (29).

The popularisation of the concept of alternative technology has been likened to the emergence of a cultural movement [Jequier (1976)]. People with widely differing philosophies have been attracted to the concept and have tended to emphasise aspects which have accorded with their own interests. It is not proposed that the alternative technology movement will be extensively discussed here - this has been done elsewhere (30). Instead one representative view from the Third

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(29) See for instance Harper (1973), Clark (1973); and for a critical review Rybcynski (1980).
(30) Winner (1980). A sociological analysis of the various interest groups coalescing in the appropriate technology movement, would probably make sense of the internal variety and tensions.

World will be analysed.

The most comprehensive formulation of the broad interpretation of the concept of appropriate or alternative technology, has perhaps been made by the Indian scientist, A.K.N. Reddy (1975). The appropriateness of technology is judged primarily in relation to the objectives of development which are environmentally and socially sustainable in the long-run. Development is viewed as a process of change directed towards:

[1] the satisfaction of basic human needs, starting with the needs of the neediest in order to reduce inequalities between and within countries;

[2] endogenous self-reliance through social participation and control; and

[3] harmony with the environment.

Appropriate technologies are those which advance these development objectives. Third World countries are seen to have essentially five sources of technologies:

[1] Western technology which is associated with a particular set of environmental, economic, and social problems;

[2] technology from other Third World countries, which is a blurred copy of technology from the West;

[3] naturalised technology, which was imported technology but which has been imitated and adapted;

[4] transformed traditional technology; and

[5] alternative technology developed according to appropriate criteria.

According to Reddy, Western technology is applicable in only a few cases. Naturalised technology might be adapted to some aspects of the environment, but might still be inappropriate to others. Little work has been done on transforming traditional technologies, and almost nothing on generating alternative technologies, as there are no paradigms to follow. This is the key area to which attention should be directed (31).

Scientists and engineers involved in the generation of appropriate technologies, Reddy argues, should absorb and generate new preferences, guidelines and paradigms. Through close contact with the end users of technologies, they must understand the economic, social, and environmental ramifications of these technologies. New patterns of technological capability must evolve. Linkages with the rural poor and traditional technology must be fostered, and those with Western institutions, and with the demands of the elite, weakened. Reddy considers the following to be appropriate paradigms which would allow the development of alternative technologies (32).

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(31) cf. Dickinson's (1972) differentiation of sources of appropriate technology: modifying existing practices; reviving older, well tried technology from an earlier stage of development of a different economy; and inventing a new technology.
(32) Reddy (1979), pp 178,179. cf. Dickinson (1972), p 149: "It is possible to describe a large number of features that may help to identify an appropriate technology. In any practical situation it is possible to envisage a range of alternative technologies that could meet the immediate and near future production needs, but final selection would have to take into account a complex set of economic, social, and technical relationships." Dickinson stresses the social aspects of technological dissemination and coined the term "socially appropriate technology".

[A] Environmental preferences:

[1] a preference for energy-production technologies based on renewable, rather than depletable, energy sources;

[2] a preference for energy-saving, rather than energy intensive technologies;

[3] a preference for technologies which produce goods that can be recycled and re-used, and that are designed for durability, rather than quick obsolescence;

[4] a preference for production technologies based on raw materials which are replenishable, rather than exhaustible;

[5] a preference for technologies of production and consumption which inherently minimise noxious or dangerous emissions and wastes, rather than those which require "fixes" to curb their intrinsically polluting tendencies;

[6] a preference for technologies of production and consumption which incorporate waste minimisation and utilisation procedures as integral components, rather than those that require them as appendages;

[7] a preference for technologies which blend into ecosystems by causing them minimal disturbance, rather than those which threaten the biosphere with major perturbations;

[8] a preference for technologies of production of housing and transportation which foster the planned achievement of moderately sized, manageable, secure, and congenial human settlements, rather than the uncontrolled growth of

gigantic, unmanageable, insecure and intolerable cities; and

[9] a preference for technologies based on the rational sustained use, rather than indiscriminate rapid devastation, of the environment.

[B] Economic preferences:

[1] a preference for technologies which are consistent, rather than incompatible, with the basic factor endowments of most developing countries;

[2] a preference for small-scale decentralised, rather than large-scale centralised technologies;

[3] a preference for need based, rather than demand orientated, product technologies;

[4] a preference for the technologies of goods and services relevant to mass consumption, rather than to individual luxuries;

[5] a preference for technologies based on local materials, rather than materials which have to be imported from abroad or transported from distant parts of the country;

[6] a preference for technologies which generate employment for under-privileged masses, rather than for privileged elites;

[7] a preference for technologies which produce for local consumption, rather than for remote markets;

[8] a preference for technologies which promote a symbiotic and mutually reinforcing, rather than parasitic and destructive, relationship between metropolises and their rural hinterlands; and

[9] a preference for technologies which reduce, rather than amplify, the inequalities within developing countries.

[C] Social preferences:

[1] a preference for technologies which cater to the needs of deprived people, rather than to the demands of the privileged affluent;

[2] a preference for technologies which lead to an enhancement of the quality of life, rather than merely to an increase in the consumption of goods;

[3] a preference for production technologies which require satisfying creative work, rather than boring routine labour;

[4] a preference for production technologies in which machines are sub-ordinated to, rather than dominate, the lives of people;

[5] a preference for technologies which lead to human settlements being designed to suit the collective and individual lives of people, rather than the requirements of agglomerations of productive units;

[6] a preference for technologies based on communal, rather than individual use of goods and services;

[7] a preference for technologies which blend with, rather than disrupt traditional technologies and the fabric of social life;

[8] a preference for the technology of scaled-down, dispersible, miniaturised enterprises, rather than the technology of mass-producing consumer goods in gigantic factories;

[9] a preference for technologies developed endogenously from the local context, rather than transferred from alien settings;

[10] a preference for technologies which increase, rather than diminish the possibility and effectiveness of social participation and control; and

[11] a preference for technologies which facilitate the devolution of power to people, rather than its concentration in the hands of the elites.

Although the above list constitutes a useful reminder of preferable alternatives to accepted norms, the question arises as to how these rather utopian paradigms will be generated. Clearly it is unsatisfactory merely to exhort scientists and engineers to develop new preferences. Reddy recognises some of the political problems of the distribution of power and control, but deals in only an abstract and schematic way with questions of how the decision making process might filter the social and economic needs of the rural poor into demands for appropriate technologies. The two key problems of technological change - the choice of technology and technical innovation - are inadequately dealt with. Reddy cannot explain how appropriate

choices of technology might ultimately be secured, other than presenting rather idealised prescriptions; nor does he examine in any detailed or original way the complex processes of technology generation and innovation.

Intermediate Technology

Although the most immediate and conspicuous factors accounting for the growth of interest in appropriate technology have been, firstly, the disillusionment with the experience of Third World development over the past three decades, and secondly, the minority debates in the advanced capitalist countries concerning the effects of modern industrialisation, the origins of the concept can be traced back much further. At the turn of the century in India, the rehabilitation and development of traditional industries was encouraged by such reformers as the Maharaja of Baroda and Rabindranath Tagore. Better known is Mahatma Gandhi's emphasis on village technologies and the development of indigenous skills and knowledge [Hoda (1976)].

More recently E.F. Schumacher's much read book, Small is Beautiful, has been instrumental in the popularisation of the concept. More than any other book on the subject, it has had a substantial impact on the thinking of administrators and planners in aid agencies and, to a lesser extent, in the Third World (33). For Schumacher, the choice of technology is the most critical decision confronting any Third World country, and he advocated an intermediate technology (I.T.) which would be more appropriate to the needs and resources of

(33) Two recent publications have listed hundreds of organisations which have incorporated the appropriate technology concept into their practice [Jequier (1979a); Bundick (1979)].

the poor people within the poorer Third World countries. In 1965, with George Mc Robie, he formed the Intermediate Technology Development Group Ltd (ITDG) in London, to promote the I.T. concept and to assist in the collection and dissemination of data on I.T (34). Schumacher argued:

> "We can call the indigenous technology of a typical developing country - symbolically speaking - a £1 technology, while that of the developed countries could be called a £1000 technology. The gap between these two technologies is so enormous that a transition from the one to the other is simply impossible.....a technology is required that would range in some intermediate position....a £100 technology" (35).

This proposal for an intermediate technology is based on the following propositions:

[1] Development cannot be simply created, ordered, bought, or comprehensively planned, as the primary causes of poverty are not merely the lack of natural wealth, capital or infrastructure. The primary causes of extreme poverty lie instead in certain deficiencies in education, organisation and discipline. Development thus requires a process of evolution such that all three of these immaterial factors become the property not merely of a tiny minority, but of the whole society.

[2] Third World countries have dual economies consisting of a small predominantly urban, modern sector where wages and the cost of establishing each workplace are relatively high; and a large, predominantly rural, traditional sector where employment opportunities are poor and productivity very low.

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(34) Events leading to the formation of ITDG are described in Mc Robie (1981), pp 19-38.
(35) Schumacher (1973), p150; see especially chapters 11 and 12.

[3] Rural unemployment produces mass migration to the cities, leading to a rate of urban growth which would tax the resources of even the richest countries. Development efforts should thus be concentrated in the rural areas and small towns, where the prime objective must be to maximise work opportunities for the un- and under-employed, and thus to set in motion the process of evolution.

[4] This requires the creation of new workplaces which are near to peoples' homes, cost little, use relatively simple production methods, and are based on locally available materials and market outlets. These development efforts should be decentralised in order to respond to the needs of the poor.

[5] The key to the creation of a very large number of workplaces within a fairly short time, is the introduction of intermediate technologies which would be immensely cheaper than the sophisticated, highly capital intensive technology of modern industry, but also immensely more productive than indigenous, traditional technology.

[6] Intermediate technologies to "help the poor to help themselves" can be developed by technologists if they are put in contact with each other in order to share knowledge and experience. Programmes are thus needed on a national and supra-national basis to develop intermediate technologies suitable for the promotion of full employment in developing countries.

[7] Appropriate technologies are characterised by their smallness, simplicity, capital cheapness and non-violence.

The most persistent and serious criticism which can be levelled at the concept of I.T. is the absence of any thorough understanding of the political dimension of both technological choice and innovation within the development process (36). An examination of Schumacher's basic argument reveals certain confusions and contradictions. He regards the modern and non-modern sectors as separate entities, such that activity designed to alleviate poverty in the latter, would be unaffected by the nature and dominance of the former - or, indeed, of the forces giving rise to an apparently dual economy in the first place. Schumacher is thus able to argue that factors such as deficiencies in education, organisation, and discipline, are causes of rural poverty, rather than the structural relationship between the two sectors, which is itself a reflection of the political economy. Intermediate technologies are then proposed which would bring about radical social change, in the form of the alleviation of mass poverty, without the prior alteration of the political and economic forces which gave rise to it. Whilst recognising that technology is not neutral with respect to its impact on society and the environment, technology is nevertheless regarded by Schumacher as politically neutral with respect to the factors governing its choice and generation.

It is here that the basic contradiction within Schumacher's writings arises. For although he concedes that the choice of industry

> "will be determined by....powerful criteria, such as raw material base, markets, entrepreneurial interests, etc" [Schumacher (1973), p149],

these constraints are explicitly not extended to the choice of intermediate technology, which is seen as an independent variable in the

(36) cf. Howes's (1979) critique of Schumacher.

development process. Schumacher thus fails to consider the many and complex factors which in reality make appropriate technology choices difficult and unlikely, given the present relations of class, power and control in many Third World countries. This unproblematic notion of the choice of available intermediate technologies has been perpetuated by the followers of Schumacher. Thus Jequier, writing on the trend in official development aid, states:

> "The growing institutionalisation of intermediate technology will inevitably reflect upon the patterns of foreign aid. Already today, many aid-giving countries and agencies are trying to focus more of their assistance programmes on appropriate technology.....In fact, in a few years time, the "consumer" of appropriate technology will probably find himself in the equivalent of a supermarket, with dozens of different tools or technologies to meet every single one of his needs" [Jequier (1976), p 111].

The language here is strikingly reminiscent of that used by the technological optimists of the 1950s and early 1960s, who saw the solution to underdevelopment in terms of unchecked access to Western, modern technology. For instance, the poor countries were seen to be in the position of being able to draw up a "shopping list" of what to buy in "the world's well-stocked supermarket for production goods and processes" [Blackett (1963), p 345]. The similarity of language is significant. Supermarket shopping implies a freedom of choice. The metaphor thus underlines the essential assumptions of both these views - namely, the unproblematic notion of choosing technologies for particular development objectives without giving consideration to the factors which in reality govern the choice, and thus the nature, of such technologies. Schumacher's thinking mirrors development thinking of the 1950s. "Small" replaces "big", but, many of the neo-classical economic assumptions concerning the choice of technique are retained in his analysis (37).

(37) It might be argued that, because of its neo-classical base,

The second contradiction in Schumacher's argument also follows from the depoliticisation of technology and concerns the problem of generating intermediate technologies. In his analysis the poor are viewed as a group who need to be provided with the means to sustain their own development. Experts will be able to identify technologies which are better than those in current use, and in so doing they will supposedly trigger off a process of self-sustaining development. But the non-modern sector's existing technology at the same time bears witness to the political and economic factors which constrain attempts to further improve the standard of living or well-being of the poor. Thus, the important questions about indigenous innovative capability are begged, and both the theory and practice of I.T. seem to imply the substitution of one form of technological dependence for another.

A further consequence of removing technology from the political sphere, is the tendency of the practitioners of I.T. to equate technology with hardware. Visiting I.T. organisations and examining the literature, it is hard to avoid the impression of an overwhelming pre-occupation with "nuts and bolts", and of a corresponding neglect of questions about how technology is created, adapted, and introduced within particular political environments. As a consequence, there tends to be a plethora of ingenious ideas and devices, which either perform well in the workshop or model village, but fail to be established in production, or which are only accessible to those who are already relatively well off.

Schumacher's concept of I.T. belongs with the narrow interpretation of appropriate technology. Schumacher, nevertheless, also incorporated non-economic factors in his analysis which were influential in the development of the broad interpretation of appropriate technology.

A number of further objections have been raised against the I.T. concept. One concerns the allegation that I.T.s are inferior. Schumacher himself attempted to refute this by arguing that I.T.s need not be less efficient. He questions Kaldor's claim that research has shown that most modern industry produces much more output per unit of capital invested than less sophisticated machinery which employs more people. Instead Schumacher argues that mechanisation and automation are introduced to increase the productivity of labour (i.e. the worker/output ratio), and that their effect on the capital/output ratio may just as well be negative as it may be positive. There is no inherent reason why I.T.s should not be efficient in terms of output produced per unit of capital. In any case he argues, taking capital as a given quantity in an under-employed economy reflects a static conception of development. Instead employment is the pre-condition of development. The output of an idle man is nil, whereas the output of even a poorly equipped man can be a positive contribution to capital formation [Schumacher (1973) p 152].

Schumacher argues in a similar way against the criticism that I.T.s would require the widespread use of skilled manpower, and that scarce resources should be concentrated in modern capital-intensive industries. This is again a static perception of development. Involvement in I.T.s will itself further skills, and those who are incapable of acting as entrepreneurs at the level of modern technology may nonetheless be fully capable of making a success of small-scale enterprise set up on the basis of I.T.

In recent years it has become increasingly difficult to distinguish between the two concepts of intermediate technology (I.T.) and appropriate technology (A.T.). Indeed Schumacher himself wrote of

the need for appropriate technologies, and although some would still claim significant differences between the two concepts, in practice they have become interchangeable.

There have been some attempts by A.T. adherents at reformulations of the concept. For instance, Jequier talks of the political dimension of A.T. (but without specifying what this might mean) and Mc Robie suggests that "the real issue is not to develop hardware, but to build up an innovation system" [Jequier (1976), p 75; Mc Robie (1976), p 108]. Nevertheless, many adherents in the A.T. movement never quite manage to escape the contradictions of Schumacher's original formulation.

A further difficulty arises out of the wooliness and inherent flexibility of the term "appropriate" itself. All production techniques are appropriate to someone's interest and virtually anybody can justify something as appropriate according to some criterion or other. This has had an important effect in the Third World, where the concept of A.T. has been criticised as coming to represent a new form of technological imperialism [Bhagavan (1979)]. The fact that the overwhelming majority of advocates of A.T. are from the industrialised countries and the haste with which the major aid and development agencies of the West appropriated the concept, have understandably aroused a certain amount of suspicion in the Third World. Concern that developing countries should adopt appropriate technologies is seen as a means of ensuring that the industrialised countries' massive consumption of natural resources is maintained. It is also seen as an attempt by the industrialised countries to develop new markets in the Third World. The recent Brandt Commission report actually makes this explicit and sees the major rationale for development aid

as being the prospect of increasing the demands for capital goods from the industrialised countries (38). ITDG in London has in the past received substantial grants from the British Government so that the Group might not only disseminate information and encourage the application of appropriate technologies, but also so that it might assist firms in Britain in the marketing of machinery and products related to appropriate technology in the Third World. The American aid agency (USAID) has been given a large grant from government funds to support:

> "an expanded and co-ordinated private effort to promote the development and dissemination of technologies appropriate to the developing countries" [Thornman (1979) p 278].

An important component of this programme has been the involvement of U.S. businessmen in the export of "appropriate technologies".

With these emphases, it is clear that appropriate technology has come to mean little more than that which people in A.T. organisations say it is.

These objections, in fairness, relate mostly to certain emphases within sections of the movement. There would no doubt be many A.T. practitioners who would argue against these criticisms. The stated objective of many A.T. organisations - that they should demonstrate the range of technical and economic options that exist - is in itself admirable, and few would wish to argue against the value of information centres and networks as important components of systems designed to redress the imbalances created by current mechanisms of technological change.

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(38) Independent Commission on International Development Issues (1980).

However, it remains true that the overwhelming impression derived from the A.T. literature is one of theoretical repetition. Much discussion remains at the level of description, with endless lists of criteria whereby the appropriateness of technology might be judged [Jequier (1979b)]. There is a need to move from an almost exclusive pre-occupation with the "appropriateness" of A.T., to a more rigorous examination of the complex relationship between technology and political economy.

Even when the political realities of technical choice and the problems of generating A.T.s are acknowledged, the debate appears to stagnate with the reduction of these problems to the single and simplistic proposition that political and social change is a necessary precursor to the introduction of more appropriate technologies. Or, putting it another way, the problem is one of social relations of production, rather than of the means of production itself. However, the acceptance of this thesis cannot absolve us from the requirement for a thorough analysis of the way in which the nature of technology is structured by the political economy, or of the way in which the operation of technology might in turn reinforce specific relations of power, control and interest within the development process.

The following questions thus arise, and will be examined in ensuing sections:

[1] Is the nature of technology related in some broad way to the nature and structure of society, and what are the implications of notions of technological determinism?

[2] How is the political component of technological choice and innovation to be understood?

Technological Determinism

In many cases, interest in the concept of appropriate technology originated from a concern for alleviating poverty in the Third World countries. This concern has led, however, to the pervasive but mistaken assumption, amongst many A.T. proponents, that the introduction of more appropriate technologies will somehow radically change society. Schumacher himself portrays this technological determinism.

> "Few people deny that technological change has political consequences; yet equally few people seem to realise that the present "system", in the widest sense, is the product of technology and cannot be significantly changed unless technology is changed" [Schumacher (1976) p 8].

In a most extraordinary article, quoting extensively from Marx and Engels, Schumacher recognises the forces which have given rise to the capitalist mode of production, yet proceeds almost immediately as though these have ceased to exist, by claiming:

> "I know of no better way of changing the 'system' than by putting into the world a new type of technology - technologies by which small people can make themselves productive and relatively independent" [Schumacher (1976) p 9].

We can perhaps concede Schumacher a degree of literary licence concerning his almost magical conception of the source of these technologies; nevertheless, our previous questions concerning how these new technologies are to be generated and introduced, remain unanswered. As will be shown below, the feature of all theories of technological determinism is their a-historical treatment of the factors governing the choice and innovation of technologies.

Even A.K.N. Reddy, when discussing the transfer of technology, incorporates elements of technological determinism. In a very contentious metaphor he argues that technology:

> "is like genetic material: it carries the code of the society in which it was produced and survived, and tries to

replicate that society" [Reddy (1975) p 332].

The proposal for an alternative technology, as has been previously argued, arises largely from a critical analysis of modern industrial technology. With these critiques has come the concept of a runaway technology, and the view that modern technology possesses some form of inner logic or dynamic which results in certain inevitable social consequences. Once the decision is made to opt in favour of modern technology, the pattern of social consequences will be determined by these imperatives of technology. The most widely read and extreme exponents of this view are perhaps Jacques Ellul and J.K. Galbraith; their writings have informed the cultural milieu in which the A.T. movement has emerged, and have thus formed an important source of these underlying assumptions of technological determinism.

Ellul argues that "technique" defines our epoch, in the way that Catholicism defined the Middle Ages. Technique is defined as "the totality of methods rationally arrived at and having absolute efficiency (for a given stage of development) in every field of human activity". A technical operation is one "carried out in accordance with a certain method, in order to attain a particular end" [Ellul (1964) pp 13-18]. Technological society is created when technique becomes its central component. Because of the unprecedented proliferation of techniques in modern times, technology has acquired the power to determine the ideas, beliefs, and myths of modern man to such an extent that all activities are now situated within a technical context. "It is useless to rail against capitalism", he argues, "capitalism did not create our world; the machine did" [Ellul (1964) p 5]. Technology is not an isolated factor in society - rather, it is a total attitude or comprehensive way of being in the world. Ellul

questions whether man can remain master in a world of means, and whether a new civilisation can emerge which includes technique as only one element among others.

The question that has been asked of Ellul, when he describes technology as "the ensemble of practices by which one uses available resources in order to achieve certain valued ends", is: what ends?; and how are they selected? [Leiss (1970)]. This one-sided emphasis on the inevitable impact of technology on culture and society, must be characterised as technological determinism. Confusion arises in Ellul's work from a failure to treat social consequences of technological progress within the context of a more general phenomenon - namely the attempt to shape behaviour according to political and economic interests.

Technological determinism does not raise such questions, or permit an evaluation of the two-way dialectical interaction between technology and the political and social milieu. The result is a technological veil (to use Herbert Marcuse's term), cast over the social processes, which obscures both the general dynamic of advanced societies and the specific role technology plays within that dynamic.

A similar form of technological determinism is found in the work of Galbraith, who in his analysis of the modern industrial state, identifies six imperatives of technology: increasing span of time; increasing capital commitment; increasing inflexibility of commitment; specialised manpower; specialised organisation; and planning [Galbraith (1967)]. These imperatives have removed power from the capitalist entrepreneur and lodged it within the technostructure of the industrial corporation. Technology appears to create a subjec-

tive power group, the technocrats, who set the goals of the corporation and society.

Galbraith's position can be similarly criticised. His notion of the imperatives of technology is derived from an ahistorical and non-comparative analysis of technological development. By encapsulating social and economic power relations within the technostructure, he ignores the larger struggles within capitalism. Marxian critique emphasises that the dynamic of late capitalism is still based on the historical division in the relations of production between the owners of the means of production and the possessors of nothing but labour power. The unique form of late capitalism is the corporation which severs (and therefore mystifies) the link between capital accumulation and the owners of that capital. As Braverman pointedly states:

> "The separation of the hand and brain is the most decisive single step in the division of labour taken by the capitalist mode of production. It is inherent in that mode of production from its beginnings, and as it develops, under capitalist management, throughout the history of capitalism, but it is only during the past century that the scale of production, the resources made available to the modern corporation by the rapid accumulation of capital, and the conceptual apparatus and trained personnel have become available to institutionalise this separation in a systematic and formal fashion" [Braverman (1974) p 126].

Technological determinists have seen technology or technological change as the prime source of values and goals, as well as of material change, within society. But in so doing they have ignored the historical roots of technological change and have obscured the relations of production which fundamentally structure the direction and nature of the choice and innovation of technology.

The Political Economy of Technological Change

Any simple model of technological determinism is easily undermined by recourse to the many examples in history which do not support the contention that "technology.....has become the prime source of material change..." [Forbes (1971) p 7]. There have been many inventions which were ignored or even suppressed, some to be re-discovered or re-invented many centuries later under different social conditions. The use of steam to drive elementary machinery, for example, was known to the ancient Greeks (39). Yet it was almost two thousand years later that the technology was put to a practical application. A plentiful supply of slave labour meant that there was simply no social or economic requirement for the ancient Greeks to exploit steam power or even small-scale labour-saving devices [Dickson (1974) p 47].

Joseph Needham's scholarly work on Chinese science and culture has demonstrated that there have also been societies with technical knowledge and skills comparable to those that existed in Europe in the Middle Ages, but which subsequently did not develop at the same rate [Needham (various dates)].

The Middle Ages saw the first wide-scale use of elementary machines, but, by the seventeenth and eighteenth centuries, medieval craft technologies began to find themselves unable to cope with the growing demands of free trade (40). As Marx and Engels wrote:

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(39) The one device that is well known is Hero of Alexandria's working model of a steam engine, which is believed to have been first made around the year A.D.50.

(40) For detailed economic histories of the evolution of technology see: Mumford (1934), Ashton (1948), White (1962), Landes (1969).

> "The feudal system of industry, under which industrial production was monopolised by closed guilds, now no longer sufficed for the growing wants of new markets. The manufacturing system took its place. The guild masters were pushed on one side by the manufacturing middle class; division of labour between the different corporate guilds vanished in the face of division of labour in each single workshop" [Marx and Engels (1952) p42].

The important fact about the beginning of the factory system, and about capitalist production in general, is that it does not seem to have been determined solely by technological or even economic factors. The Industrial Revolution emerged from the class relations of capitalism which had begun to establish themselves with the rise of the merchant class, well before any major advances in production technology and the emergence of manufacturing industry and the factory system. Simply stated, the reasons for the emergence of the factory system were because the merchants wanted:

[1] to control and market total production;

[2] to maximise the input of work by forcing workers to work longer hours at greater speeds;

[3] to take control of all technical innovation so that it could be applied solely for capital accumulation;

[4] and generally to organise production so that the role of the capitalist became indispensable.

Thus, under the authoritarian and hierarchical class relations of industrial capitalism, technological innovation was determined not only by a concern for the efficiency of productive technology, but also by the need for a technology which maintained authoritarian forms of discipline, hierarchical regimentation, and fragmentation of the labour force. There was little point in introducing machines

capable of increasing the efficiency of production without sufficient control over the work force to ensure that the machines were operated to their maximum capacity. Later, with the growth of labour unions, technological innovation took on a new role - not simply to help create a framework within which discipline could be imposed - but a conscious effort to reduce dependency on labour. As Andrew Ure, the arch apologist of the factory system, wrote when discussing the innovation of the self-acting mule (in 1830) as a means of overcoming the high wages demanded by the skilled spinners:

> "This invention confirms the great doctrine already propounded, that when capital enlists science in her service, the refractory hand of labour will always be taught docility" [Ure (1835) p 368].

Technical innovation thus proceeds not so much from the logic of technology, as from the interests of capital - particularly from the need to maintain and further a division of labour that keeps the labour force safely under control.

It is this sharp division between mental and manual labour, reinforced through the introduction of machinery, which establishes the very basis for the reproduction of relations of power and control. As Marx wrote:

> "It is a result of the division of labour in manufactures, that the labourer is brought face to face with the intellectual potencies of the material process of production, as the property of another, as a ruling power. This separation begins in simple co-operation, where the capitalist represents to the simple workman, the oneness and the will of the associated labour. It is developed in manufacture which cuts down the labourer into a detailed labourer. It is completed in modern industry, which makes science a productive force distinct from labour and presses it into the service of capital" [Marx (1954) p 341].

The separation of labour from ownership of the means of production constitutes, in Marx's analysis, the essence of the capitalist mode of production with its antagonistic class relations. The capitalist,

who owns and controls the means of production, is able to purchase workers' labour power and extract surplus value. Surplus value arises because the capitalist compensates the worker for that fraction of the working day necessary for the maintenance and reproduction of the labour. The rest of the working day is spent producing surplus value for the benefit of the capitalist. Surplus value, transformed into capital, allows the capitalist to reproduce positions of ownership and control of the means of production and the material conditions for the mode of production which operates to his benefit. Capitalist relations of production thus require labour processes in which the amount of surplus labour can be increased through such means as extending the duration of the working day and the intensity of work, and, because there are physical and psychological limits to the latter, by increasing the productivity of labour. Thus, technical innovation is one way in which the capitalist may increase the surplus value under his control.

But technological change and the increasing concentration of the means of production give rise to a basic contradiction in capitalism. The requirement for increased capital accumulation both accelerates technological changes and at the same time hinders it. This is because of the contradictory effect technological change has on the rate of profit.

On the one hand, technical innovations support the process of accumulation by greatly augmenting labour productivity. Thus, the ratio of surplus value produced per unit of labour (or variable capital) increases, and hence also the rate of surplus value, which has the effect of increasing the rate of profit.

On the other hand, the increased use of machinery, equipment and materials through mechanisation and automation implies an increase in the technical and organic composition of capital, and greater proportions of capital are required for investment in the means of production. This implies a fall in the rate of profit.

There is a trend for the organic composition of capital to increase to a greater extent than the rate of surplus value, thus producing a decline in the profit rate (41).

One of the purposes of research and innovation is to attempt to counteract the tendency of the rate of profit to fall, and to create new opportunities for profitable investment. Hence, capital concentrated in transnational corporations is able to relocate production in Third World countries with lower wage rates. The burgeoning free trade zones in many of these countries have reinforced this trend with their allowances for the unrestricted movement of capital and profits, tax holidays, and restrictions on unionisation.

Innovations in technology have seldom been neutral, but have been part of the political process itself. The capitalist division of labour with its separation of manual and intellectual work, of execution and decision, of production and management, is a technique of domination as much as a technique of production. David Dickson has argued that technology adopts a political function in society, which is related to the distribution of power and the exercise of social control [Dickson (1974)]. It does this both in a material and in an ideological fashion. On the material level, technology sustains and

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(41) $r=s/(c+v)=s'/(q+1)$; where r= rate of profit, c= constant capital, v= variable capital, s'= rate of surplus value = s/v , q = organic composition of capital = c/v [Marx (1959), p 42].

promotes the interests of the dominant social group; and, on the ideological level, technology acts in a symbolic manner to support and propagate the legitimising ideology of this society.

In Dickson's terms, the current "ideology of industrialisation" has obscured the way in which technological innovation is intimately related to the issues of power and control in society, by explaining it in the apparently neutral terms of increased efficiency and productivity. To reveal the political and social forces at work, it is not sufficient to look merely at the consequences of a particular technological development, or even at the economic conditions that made its introduction possible. Rather, the specific reasons leading to the process of innovation have to be examined within the context of the overall system or mode of production. As we have seen, the nature of technology has come to reflect and legitimise the dominant modes of instrumental and productive activity of a society. Under the authoritarian and hierarchical class relations of industrial capitalism, technological innovation was determined not only by a concern for efficiency of production technology, but also by the requirements for a technology which maintained authoritarian forms of discipline, hierarchical regimentation and fragmentation of the labour force. Industrialisation has appeared to necessitate, and hence to validate these relations.

This ideology of industrialisation is experienced as a myth. Dickson understands the function of a myth as explaining or interpreting a situation or set of events by providing them with an apparent social or historical context. The form of technology and its historical development are regarded as natural and inevitable, and hence the myth evolves that technology is politically neutral. This myth is an

essential element in the general mechanistic and functionalist ideology of contemporary society, which gives equivalence to the concepts of industrialisation, modernisation and technical and social development. Technical innovation is interpreted as objective, the logical response to objectively defined economic conditions, and is expressed in terms of increased efficiency, rationalisation, the need to maintain a competitive position in the world market, or the technical solution to social needs.

It is with regard to the latter that the idea of appropriate technology has often been associated. But when it ascribes the same political neutrality to technology within the development process, and technological innovation is still held to be determined by supposedly objectively assessed social and economic conditions, the concept of appropriate technology can become little more than a sophisticated extension of the ideology of industrialisation. Failure to take cognisance of the political environment means that social problems are defined in technical terms. But the very way the problem is defined must mean that important values are built into the technical solution. This can have unfortunate consequences. For example, to be successful, appropriate technology invariably depends on specific types of political organisation - namely, a decentralised and regional approach to planning. Yet political issues are explicitly avoided by many A.T. proponents to the extent that mechanisms which govern the choice and innovation of technology remain unaltered, and technologies which are introduced serve merely to sustain and promote the interests of the dominant elite, in both a material and ideological fashion.

Part of the problem of the broad interpretation of appropriate

technology in general, lies in its emphasis on definitions of A.T.s as those that facilitate the meeting of specific development ends. Because the issue of technology in development is posed in this way, it ignores as irrelevant questions concerning the factors which structure its generation, choice and nature. The A.T. literature has generally ignored these problems and has been unaware of the large and informative literature on technological change. There has been a corresponding lack of awareness and critical appreciation by many of those concerned with introducing more appropriate technologies for the development of Third World countries, of the large body of literature on development theory.

TECHNOLOGY IN DEVELOPMENT THEORY

Many of the broader theories of development have incorporated perspectives concerning the interrelationships between science, technology and development. This section will be devoted to a brief, critical examination of some of the more important theories, and emphasis will be given to those parts that deal specifically with the role of technology, in order to further establish a framework against which processes of technological change in rural development might be studied.

Rostow's Stages of Growth Theory

Rostow's concept of "stages of growth" serves as a useful starting point for the analysis of the evolution of development theory, both because it is representative of the assumptions of the orthodox, modernisation theories typical of the 1960s and because of the central role it awards to technological change (42).

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(42) Rostow (1960). Korea, for instance, based its science and

In attempting to explain economic growth, Rostow proposed a linear interpretation of economic history, postulating five stages through which all societies must necessarily pass in order to arrive at the high mass-consumption state which corresponds to the advanced capitalist economies of our time.

[1] In the first, traditional (and "pre-Newtonian") stage, access to modern scientific and technical knowledge cannot be secured in a regular and systematic way, and thus limits exist for the level of per capita production that can be obtained.

[2] The second stage, the precondition for take-off, is characterised by acceptance of the Newtonian world-view that the physical world is capable of being understood and manipulated in terms of relatively few fundamental laws; and a new type of entrepreneur emerges willing to invest in non-traditional activities such as industry.

[3] The take-off into self-sustained growth is the third stage of Rostow's theory. Initially he defined the take-off as:

> "the interval during which the role of investment increases in such a way that real output per capita rises and this initial increase carries with it radical changes in production techniques and the disposition of income flows which perpetuate the new scale of investment and perpetuate thereby the rising trend in per capita output" [Rostow (1958), p 154].

[4] The fourth stage, the drive to technological maturity, is defined as a period, considerably longer than the take-off, during which science and technology are systematically applied to production. The capital goods sector develops, agriculture

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technology planning on a stages of growth theory. See: Ministry of Science and Technology, Republic of Korea, The Long Term Plan for Scientific and Technological Development (Seoul, Jan. 1970).

becomes modernised, education expands to meet the needs of industrialisation, and an efficient communications network is established.

[5] The final stage is characterised by mass consumption of durable goods and services. The welfare state emerges and becomes the main political manifestation of a society which has moved beyond technological maturity.

Rostow's "stages of growth" theory has been criticised mainly for its rigid concept of development which depends on the postulate that there is a unique path through which all countries must proceed before becoming "advanced". An early warning of the validity of comparisons between the initial stages of development of industrialised countries and the present conditions in the Third World, was made by Kuznets.

> "Both the absolute and relative economic position, as well as the general cost of the immediately antecedent history, of the now developed countries in their pre-industrial phase were cardinally different from the economic position and the immediate historical heritage of the underdeveloped countries of today. It is, therefore, far from safe to extrapolate economic or demographic aspects from the earlier records for the developed countries to current and prospective levels for the underdeveloped". (43).

Modernisation theories often imply a technological determinism in which the pattern of technical progress is fixed according to the science and logic of technology and where social organisation adapts to technical progress at each stage of development, according to the imperatives of technology. Technology is presented as the pure application of the laws of nature to the problems of production, and

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(43) Kuznets (1958), p 151 in Agarwala and Singh (eds). This book contains a collection of important and representative papers of the period, and includes articles by Meier, Baran, Rostow, Furtado, Eckhaus, Lewis, and Chenery.

some of the aura of science can be transferred to the machines which supposedly derive from its principles. From this point of view, the very idea of an alternative path of industrialisation appears to be an absurdity. But on the face of it, it is implausible that the different cultural and economic values of different societies should have as little impact on their patterns of development as is assumed by such modernisation (and convergence) theories (44).

Even more important, is the fact that the range and level of technology now available to Third World countries creates different development opportunities and problems from those faced in the early stages of the countries which are now industrialised. Furthermore, technological development in the Third World is intimately related to the economic and political relationships with the advanced capitalist countries. This perspective, which effectively undermines any linear conception of development, has found expression in the structuralist and dependency schools which have arisen within the Latin American development context.

The Structuralist School

The structuralist view of development differs radically from Rostow's in that, although historical factors are also explicitly taken into account, a linear and independent notion of the development process is rejected in favour of an emphasis on the structural economic interrelations between developed and less developed countries. The development of some countries is seen to take place at the expense of the underdevelopment of others. The structuralist view has found its

(44) For a critical discussion on convergence theories of technological development see: Fleron (1977).

strongest expression in the approach to economic development theory and strategy of ECLA (CEPAL) and its most representative economists, Prebisch and Furtado. The latter has summarised this point of view in the following terms:

> "As a consequence of the rapid spread of new production methods from a small number of centres radiating technological innovations, there has come to existence a process tending to create a worldwide economic system. It is thus that underdevelopment is considered a creature of development, or rather, as a consequence of the impact of the technical processes and the international division of labour commanded by the small number of societies that espoused the industrial revolution of the 19th century. The resulting relations between these societies and the underdeveloped areas involve forms of dependence that can hardly be overcome.....underdevelopment cannot be studied as a 'phase' of the development process, since such a 'phase' would be overcome if certain factors came into play simultaneously. And, since the underdeveloped economies are contemporaries of - and in one way or another, dependent on - their developed counterparts, the former cannot retrace the experiences of the latter. Therefore development and underdevelopment should be considered as the two aspects of the same historical process involving the creation and the spread of modern technology" [Furtado (1970a) p xvi].

The initial work of ECLA economists gave primary importance to questions concerning the participation of Latin American economies in the international division of labour, and focussed on analyses of the deterioration in the terms of trade, dependency, and centre and periphery relationships. Since the 1960s, they have devoted most of their attention to the internal problems of development, and policy issues such as bottlenecks for the expansion of import substitution development.

Prebisch's theses, on the deteriorating terms of trade, helped highlight the problem of the dependence of Latin American economies on an export sector which was usually dominated by foreign interests. This consciousness gave rise to policy proposals for import substitution industrialisation (ISI) as a means of producing industrial

consumer goods which were previously imported. Tariff protection would be provided for infant industry.

ECLA theorists postulated that import substitution first concentrates on technologically simple goods because of the domestic level of technical knowledge and skills, and also because of the restrictions imposed by the internal market. But, import substitution industrialisation increases the requirement for imported technology which is capital intensive, and hence becomes responsible for the relatively little employment created by industry. Furthermore, substitution becomes increasingly difficult when its scope is broadened to durable consumer goods, intermediate goods, and capital goods, not only because of the greater complexity of production technologies, but also because they demand scales of production and investment that clash with the narrowness of markets in Third World countries (45).

Because of the nature of import substitution industrialisation and the financing needs of these countries, foreign investment through transnational corporations (TNCs) began to play a dominant role in the economies of Latin America in the 1960s. Furtado has argued that the forceful expansion of the transnational corporations has resulted in a process of transnational integration such that technology, embodied in equipment and the design of consumer goods, tends to be less and less the object of market transactions. Instead, it is transferred internally among the various component firms of the transnational corporations. The capacity to control technical progress and to impose consumption patterns has been the decisive factor

(45) For a summary of the controversy on import substitution, see: Hirschman (1968), and for a critical evaluation of the experience of ISI in Africa: Fransman (1982a).

in structuring the systems of production of the dependent economies [Furtado (1970 a and b).

A key point, though, about ECLA and many of the structuralist economists, is that radical disengagement from the international capitalist economy is not considered. Rather this school of thought has provided a basis for various reformist and nationalist ideologies which aim at modernising the economy by developing the local bourgeoisie. It has gradually been recognised that:

- "ISI has not, in practice, significantly alleviated the balance of payments constraint; it has led to a growing dependence on a largely imported, capital-intensive technology and has not created extensive employment opportunities or indigenous technological development; the process has been heavily dependent on foreign capital and has emphasised the establishment of consumer goods industries at the expense of investment and capital goods industries; it has led to what many would regard as an undesirable redistribution of income and in general it had failed to generate a sustained process of economic growth" [Nixson (1982), p 49].

The modernisation of productive and social structures proposed by ECLA thus began to appear insufficient to deal with the continued dependence of Latin American economies. It was against this background of the lack of development of many of the Third World countries that the critical revision of structuralist ideas resulted in the emergence of dependency theory.

Dependency Theory and Technological Dependence

If the relative failure of ECLA theory has constituted one source of the growth of dependency theory, the other generally cited source has been the work of the neo-Marxists Baran and Sweezy (1966), and Frank (1967; 1969). These two currents often determine the different ideological standings of the dependency theorists (known as dependistas)

in the degree of their proximity to either ECLA or to Marxian analysis and a more authentic opposition to capitalism. There were, of course, many other more diffuse influences, including the long-standing tradition of Marxian intellectualism in Latin America, internal political debate on the role of the national bourgeoisie, and also the influence of the Cuban revolution.

Gunder Frank has in many ways come to symbolise the dependency approach to readers outside Latin America. Following Baran and Sweezy, he asserted that the existence of surplus and its utilisation form the basis for an analysis of different societies. Under monopoly capitalism more surplus is generated, yet there is a contradiction because of the failure to provide the consumption and investment outlets required for the absorption of rising surplus. Hence metropolitan capital expands into the periphery in order to stimulate demand. Capitalist penetration, through the appropriation of indigenously produced surplus, promotes a process of underdevelopment which is not only economic, but also political and social. Thus, the primary mechanism of underdevelopent is the process of surplus transfer from periphery to metropole. Frank argues that there are strict limits on capitalist development at the periphery: a national bourgeoisie class has been eliminated, or prevented from forming at all, thus precluding further, or future development under capitalism [Frank (1978)].

While often critical of Frank, most of the more orthodox dependency authors share his scepticism about the prospects of capitalist development at the periphery. Dos Santos for example would put more emphasis than does Frank on the alignment of the national bourgeoisie with foreign capital, and less on the surplus drain. He also

emphasises, as a defining characteristic of dependence, the inability of peripheral societies to develop a capital goods sector. But he would agree with Frank that capitalist development (or, at least, autonomous capitalist development) is not possible, and that a socialist path of development offers the only escape for peripheral societies [Dos Santos (1973)]. Szentes, the Hungarian development theorist, in contrast, claims the possibility of a gradual shift in the balance of forces in favour of underdeveloped countries, within the existing framework of international economic relations. He distinguishes between:

[1] direct economic dependence (where key sectors of the underdeveloped country's economy are in the hands of foreign capital);

[2] trade dependence (dependence on a limited number of capitalist countries for exports and imports,and a specialised export sector);

[3] financial dependence (foreign control over the banking and credit system, and dependence on foreign loans and grants for development); and

[4] technical dependence (dependence on technological assistance).

He also distinguishes between direct and indirect income drains from Third World countries. Repatriation of profits from foreign capital investment constitutes a direct and indeed major transfer of income. Inequality of exchange in world markets, uneven rates of technical advance and the unequal distribution of the gains from technical progress are among the important sources of an indirect income drain.

The unevenness of technical advance is not only reflected in the distribution of gains from trade, but also in the sale of technological inputs in an expanding market for knowledge and technology [Szentes (1976)].

The concept of technological dependence is an important element in much of the dependency literature, and reflects in part an awareness in the early 1970s of the need to make the theory more operational. There was also a shift in attention to the nature of domination relations between the industrialised countries and the Third World; from the control of primary products, to the control of finance; then to the control of production; and finally to the control of technical knowledge as the chief means of maintaining and increasing domination.

Stewart, for example, sees the weakness of indigenous technological capacity and knowledge in the Third World as not only the outcome, but also the prime cause of technological dependence, and indeed of dependency in general [Stewart (1977)]. She points to the self-perpetuating nature of the tendency to import modern, relatively capital intensive technologies from the industrialised countries, despite their inappropriateness to the social problems in developing economies. This tendency is self-perpetuating because employees in the modern sector, using machinery that ensures high labour productivity, earn wages high enough to create, sustain and encourage demand for products whose quality specifications require production technologies which are fairly capital-intensive. Simply stated, modern sectors are generally supported by governments which represent, to a greater or lesser extent, the interests of certain elites who benefit from the activities of the modern sector. The use

of foreign technology builds up biases in selection mechanisms in favour of its future use, leading to further decisions in favour of such technologies. The large, traditional and rural sector is generally excluded from decision-making processes and choices are thus made that favour the interests of the elite minority.

Stewart describes technology as a matrix, consisting of a set of techniques, each of which is associated with a "vector of characteristics" which include the nature and specification of the product, the inputs used, the scale of production and the associated management techniques. These characteristics are designed to fit into the economic, institutional and technical circumstances of the economy. The inappropriate nature of industrialised country technology for Third World countries arises from the differences in the economic and institutional environments. If a technique is transferred to a completely different environment, then the original environment has to be reproduced (46). This leads to:

[1] a heavy reliance on foreign sources for materials, personnel, parts and services, technologies for linked processes, and for markets;

[2] a concentration on the minority modern sector to provide resources and demand;

[3] a technology alien to local history, with the inevitable consequences of inefficient production.

Technology is also viewed by Stewart as a package, and the efficiency

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(46) cf. Reddy's metaphor likening technology to genetic material. The criticisms levelled against Reddy, apply also to this statement of Stewart.

or otherwise of a particular technique depends not only on its own performance, but also on that of the surrounding and linked technologies. Given a productive structure based on the production of industrialised country products, and using industrialised country techniques, the natural consequence is that local science and technology systems are small and lack indigenous innovative capability. There is a vicious circle in which weak technological capacity reinforces dependence and dependence creates weakness. Stewart recognises that the creation of a demand for more appropriate technologies, a local innovative capability, a more equal income distribution, and an emphasis on small industries and agricultural technologies which would reverse the preference for the modern sector, are ultimately political problems and require state intervention. However, she remains sceptical as to whether this shift is possible, given the current relations of dependency.

Not all of the dependistas hold such a pessimistic position. Cardoso, for instance, refuses to place theoretical limits on capitalist development at the periphery. He sees dependent capitalism as capable of growth and of transforming social relations of production, although not of resolving the unemployment and poverty problems of the majority of the population. Cardoso's complex and prolific writing often make it difficult to discern a consistent methodological position, and some of his recent writing has been so critical of the conclusions of the dependency school as to place himself almost outside of it. Like other dependistas, he emphasises, in characterising dependency, the absence of capital goods and financial sectors, the import of technology, and the significant penetration by foreign enterprises. Dependency is understood to be an historical phenomenon

which expresses the nature and consequences of the introduction of the capitalist mode of production to Third World countries. For Cardoso, though, the fundamental theoretical problem is the elucidation of the structures of domination as a means of understanding the dynamics of class relations. The notion of dependence:

> "finds not only internal 'expression', but also its true character as implying a situation that structurally entails a link with the outside in such a way that what happens internally in a dependent country cannot be fully explained without taking into consideration the links that internal groups have with external ones. Dependence should no longer be considered an 'external variable', its analysis should be based on the relations between the different social classes within the dependent nations themselves" [Cardoso and Faletto (1979) p 22].

Interestingly, he insists on the need to analyse particular situations rather than to develop general theories:

> We do not try to place theoretical limits on the possible course of future events. These will depend, not on academic predictions, but on collective action guided by political wills that make work what is structurally barely possible [ibid. p 175].

The dependency school has in recent years come under sustained attack (47). The major criticism made is that the dependency school fails to grasp the real nature of the process of underdevelopment, chiefly because (as Kay has argued) its theoretical framework is an eclectic combination of orthodox economic theory and revolutionary phraseology [Kay (1976)]. These problems derive as much from the original influence of the ECLA school as from the early writings of dependency theorists, in particular Gunder Frank. Capitalism is a crucial concept in Frank's discourse. Yet he seldom defines what he understands by capitalism, and then only in vague terms - as a system of production for the market in which profit constitutes the motive for pro-

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(47) For an overview see the special issue : "Is Dependency Dead?", IDS Bulletin , vol 12, no 1, 1980.

duction and where profit is realised for the benefit of someone other than the direct producer. For Frank, the existence of a substantial market constitutes the essential difference between capitalism and pre-capitalist economies, such as feudalism. As Laclau points out, this understanding then allows Frank to speak of capitalism in 16th century Chile, even though the pre-conditions of capitalism, such as accumulated capital, the separation of the workers from their means of production and the selling of their labour power, did not even exist. If capitalism was not the dominant mode of production in this period, it is clearly erroneous to argue that "capitalist expansion" promoted "capitalist underdevelopment". Laclau argues that these problems arise because Frank does not employ concepts central to Marxism, such as the mode and relations of production.

Taylor echoes these criticisms, arguing that Frank fails to define capitalism as a system of production whose reproduction and development require specific forms of capitalist penetration of non-capitalist societies. Frank fails to deal with the different effects of different stages of capitalist penetration of non-capitalist modes. All he can reply is that they produced capitalism, which is not only inadequate, but often quite incorrect, if by capitalism is meant a specific form of production [Taylor (1979)].

These criticisms have prompted the more general question of the usefulness of dependency theory as a tool for analysing economic development in Third World countries. Colin Leys has pointed out the theoretical repetition and stagnation in the literature on underdevelopment and dependency, and has drawn attention to the lack of precision of many of its concepts. The vague typology of centre and periphery, and the notion of the dependence of the latter on the

former, give rise to the question of whether this perspective is not a fairly arbitrary way to "sensitise us to certain features of economic change and at the same time to anaesthetise us to other features" (48). In the same way that Frank's writings ignore the many important effects of the relations of production in capitalist development, dependency theory in general is unable to formulate or solve the problem of how domestic capital accumulation forms the basis of class relations and struggles within the state, and of its ambiguous relationship with foreign capital. Instead, dependency theory merely serves to transform the old polemical inverses of modern/traditional, advanced/backward, and rich/poor into centre/periphery, developed/underdeveloped and dominant/dependent.

Warren has also remarked on the lack of precision of the concept of dependence:

> The concept of dependence has always been imprecise: such significance as it has relates almost entirely to political control of one society by another. Since national economies are becoming increasingly interdependent the meaning of dependence is ever more elusive, not to say mystical [Warren (1981), p182].

Even the meaning of development is often obscure. Usually it is taken to mean the kind of capitalist development experienced by the metropolises. But, if underdevelopment suggests that the Third World cannot follow the same path, it is incumbent upon dependency theorists to disclose what development can or should mean. As Bill Warren has noted, what underlies dependency theory is a tacit idealised model of capitalist development without inequalities, or unevenness, such that the performance of no actual Third World economy could ever be described as "successful" in terms of it [Warren (1973)]. Because

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(48) Leys (1977), p 96, quoting Booth. See also Leys (1980) and Lall (1975).

the dependency school sees the periphery locked into underdevelopment, it tends to minimise or dismiss the development which actually occurs there as being inegalitarian, unbalanced, and at most short-lived or illusory. This mechanistic notion of the inescapable and vicious circle of underdevelopment and dependency, forms the basis of the third criticism.

The most important question in the debate about dependency is whether or not there are theoretical reasons for thinking that the ex-colonies cannot develop domestic capitalist production. The dependency school argues that patterns of subordinate development established at the periphery of imperialism before and during the colonial phase, are self-perpetuating.

Frank, following Baran, located the primary mechanisms of underdevelopment in processes of surplus transfer from periphery to metropole. Warren, seeing no theoretical reason for any general motive to transfer surplus in this way, or why the interests of the imperialist countries should necessarily be served by the maintenance of underdevelopment in the rest of the world, concluded that capital formed at the periphery could be accumulated there. He backed these conclusions with evidence from some of the so-called newly industrialised countries (NICs), former colonies which are now beginning to develop significant domestic productive bases [Warren (1973)].

Emmanuel entered the debate by rejecting the alleged evidence that this was happening, proposing instead that capital is drawn towards the poles of its own existing accumulation [Emmanuel (1974)].

Leys argued, from case studies in Kenya, that capital accumulation in "periphery" countries cannot be understood by an examination only of

the operation of the world economy and the transfer of surplus to the "centre", as dependency theorists suggest. The structure of social classes and the role of the state should also be examined. He rejects any notions that the state is a neutral arbiter of interests, or that it is simply the instrument of foreign capital. The initiatives of the state can reflect the class power of an indigenous bourgeoisie which is able to protect and facilitate the movement of African (or national) capital into productive sectors of the economy. Class structures and struggles are thus seen to be crucial in determining the level and rate of capital accumulation in a "periphery" country [Leys (1978)].

The debate has not produced conclusive evidence to show either that capitalist development cannot occur at the periphery, or that it is eventually bound to. Rather it demonstrates the need to study and theorise on the conditions under which some periphery countries have, and others have not, experienced significant measures of such growth.

The dependency school still has many adherents and its concepts permeate much discussion, research, and policy on Third World development. It has been argued that, although some of the propositions of the original theory have been shown to be untenable, the events of the 1970s strengthen the main notion of dependency [Bienefeld (1980)]. Permanent categories of periphery and core, universal generalisations about the limitations of technology transfer, or the lack of a national bourgeoisie in the periphery, have all been revealed as the gross over-simplifications they always were. Nevertheless, it is argued that two fundamental propositions of the dependency debate have been strongly reinforced: namely, the central importance of the potential inhibiting effect of the international

context for the process of development; and the critical importance of national policy in establishing the basis for a relatively more advantageous participation in the global economy. It can be countered that these notions are hardly peculiar to dependency theory alone, and thus do not constitute a legitimate defence of its validity.

Dependency theory did , however, demonstrate the inadequacy of the analyses of many orthodox development economists in the 1960s, with its rejection of modernisation theory, and the analysis of the nation state, not in isolation, but in the context of international capitalism. But, dependency theory still fails as an explanatory account of underdevelopment. It does not explain what causes underdevelopment or why capital is not accumulated to any extent in the Third World. Criticisms of the dependency school have indicated a way forward through a more analytical use of such concepts as relations and mode of production in order to illuminate the manner in which capitalist penetration and development occur (49).

Taylor, for instance, has proposed the following programme [Taylor (1979), p101-104].

[1] A rejection of notions of underdevelopment as being incapable of providing any rigorous basis for analysing the existence, forms or effects of the various types of capitalist penetration within societies dominated by non-capitalist modes of production.

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(49) The past decade has seen a great deal of work on analyses of pre-capitalist modes : Hindess and Hirst (1975),(1977); Bettleheim (1972); the French anthropologists Meillassoux (1964); Godelier (1972),(1977); Terray (1972); and the French political economists Rey and Dupre (1973).

[2] A need for the discourse of historical materialism as a means of analysing a Third World country as a social formation which is dominated by an articulation of (at least) two modes of production - capitalist and non-capitalist - with the former increasingly dominant over the other (50).

[3] The identification of the mode of production that was dominant within the non-capitalist mode and the form of development specific to it, the possibility of different forms of capitalist penetration and how the pre-capitalist conditions for the capitalist mode of production are established.

[4] The analysis of underdevelopment as a social formation that is transitional due particularly to imperialist penetration which has as its specific economic effect a separation of direct producers from the means of production.

[5] "As a result of its being determined in the last instance by an articulation of modes of production, the Third World formation is characterised by a whole series of dislocations between the various levels of the social formation" [p 103]. Imperialist penetration intervenes economically, politically and ideologically within these dislocated levels in order to ensure the increasing dominance of the capitalist mode of production and to create that restricted and uneven form of economic development

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(50) A mode of production has been defined as "an articulated combination of relations and forces of production structured by the dominance of the relations of production"[Hindess and Hirst (1975), p 9].
A social formation is defined as "a complex structure of social relations, a unity of economic, ideological and, in certain cases, political structural levels in which the role of the economy is determinant" [ibid p 13].

with its political and ideological guarantees, which can in turn produce the pre-conditions for the possibility of a socialist mode of production.

Taylor's theses have been criticised as a "turgid restatement of a now familiar set of ideas dressed up in awkward and pretentious language in the name of theoretical rigour" [Booth (1980), p 768]. Certainly many of Taylor's propositions are established by definition rather than by reasoned argument (51). But, it is when this form of analysis is applied to the rural areas of Third World countries, where non-capitalist modes coexist with capitalist production, that the relevance of this approach to this thesis becomes apparent; for it can provide a framework within which processes of technological change might be studied (52).

Underdevelopment in rural Africa

A recent and iconoclastic work, also within the framework of historical materialism, has commented on the ethnocentric bias of many Western scholars writing on underdevelopment in Africa [Hyden (1980)]. He questions the validity of analytical models based on the premise of the overriding dominance of capital in rural areas in Africa. Instead of describing societal structures in terms of a given model, Hyden's purpose has been to identify actual structural relationships by trying to sense the parameters of social action in rural areas. He remarks on the need to question (as Laclau does) the

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(51) There are also difficulties in the epistemological basis of Taylor's theses which largely follow the work of Althusser and Balibar (1970). The economistic bias of this position has been discussed by amongst others Hindess and Hirst (1977).
(52) A refreshingly incisive example of this form of analysis is the historical work on Lesotho by Kimble (1978).

assumption that the maintenance of pre-capitalist relations of production in the peripheral areas is an inherent condition of the process of accumulation in the metropolitan countries [Laclau (1971), p 35]. As Kay has argued:

> "we have to face the unpalatable fact that capitalism has created underdevelopment not simply because it has exploited the underdeveloped countries, but because it has not exploited them enough" (53).

Hyden takes this further and argues that the roots of Africa's underdevelopment are not found in the international system, but in the rural areas of that continent. The problems of underdevelopment do not stem from an excessive penetration by world capitalism. Rather they stem from the inability of capitalism to produce the same dynamic transformation of the material base as it once did in Europe and America. He continues:

> "Development is an ambiguous process, in which the risks of loss are as great as the prospects of gain. This ambiguity may be particularly common among those who have been only marginally affected by the forces of development and who have retained a reasonable degree of social and economic autonomy, for example, the many smallholder peasants in Africa. In their case, development is not only a matter of improvement of material conditions. It is also a question of losses in respect of other values and, above all, it is a matter of trading social autonomy for increased dependence on other social classes" [Hyden (1980), p 4].

African countries south of the Sahara (with the obvious exception of Republic of South Africa and, perhaps, Zimbabwe) are unique in that their economies are dominated by rural smallholder producers, or peasants, who have persistently resisted colonial and post-independent state attempts at modernisation and have enjoyed a degree of independence much greater than either their Asian or Latin American counterparts [Goody (1971)].

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(53) [Kay (1975), p55]. For a critique of Kay see Bernstein (1976).

What makes the peasants different from other social classes is their position as producers with direct access to land, and production (with the help of family members) largely for their own consumption - but at the same time they are integrated into a larger social economy, to which they are forced to make a contribution in one form or another. A peasant community may be involved in commodity production based on the capitalist criteria of exchange value, but this need not be its total culture. Even if it is affected by the wider capitalist world economy, the village community is not just a reflection of the larger society and the global economy. Pre-capitalist social formations survive because the economic structures that give them life are still at work.

The peasant mode is characterised by such features as a rudimentary division of labour; a domestic orientation with production units centred around households (and thus tending to be small); limits to the time and effort that peasants can spend on co-operation; the need to meet minimal human needs in a reliable manner; an overwhelming dependence on the natural resource endowment, and on human skills and simple tools, sometimes augmented by animal draft power; a distrust of extension agents who do not share the same experiential knowledge of agricultural practices; and a general ignoring of the state, which (unlike in other modes of production) is not integrally linked to the peasant mode of production. Thus, in Africa, peasants still hold the key to agricultural development - not the politicians, administrators or experts, whom the peasants see as contributing neither capital nor expertise, and who personally do not incur any of the risks involved in production.

But, the success of the pre-modern social formations in holding

capitalism at bay has inhibited development efforts in Africa. Turning the peasant producer into a modern farmer is not a simple process which can be achieved by education, training, and government services alone, as many Western liberals believe. Hyden argues that it is likely to be a process full of discontinuities and conflicts; he claims that nowhere in history have the peasantry been spared coercive measures, which he sees as a necessary evil of modernisation. He argues that in Africa, socialism will increasingly be called upon to supplant capitalism in trying to achieve that objective - that is, to serve as the main agent of modernisation.

There is a sense here in which Hyden has come full circle, from the earlier rejection of modernisation theory to the advocacy of neo-modernisation. Part of the problem here is that Hyden (and other like-minded analysts) do not give serious attention to the nature of scientific and technical knowledge, and to how different forms of technological development become feasible within different social and economic environments. Some recent studies have indicated the importance of indigenous technical knowledge, and of the processes whereby people generate, incorporate, adapt, and transmit knowledge [Howes and Chambers (1979)]. Rural people, free of disciplinary blinkers, usually not only know more about local conditions and needs, but also take a more holistic view than do specialists from outside. This knowledge must be taken into account in any efforts towards development and technological change.

SUMMARY

A number of important factors related to technological change have emerged from this review of the literature which has provided the framework for the case study in Lesotho. These are summarised briefly (and simply) below:

[1] Technology is not merely hardware or machinery, but incorporates knowledge, techniques and forms of social organisation. In its broadest sense:

> "Technology discloses man's mode of dealing with nature, the processes of production by which he sustains his life, and thereby also lays bare the mode of formation of his social relations, and of the mental conceptions that flow from them" [Marx (1954), p 352].

[2] Furthermore, technology is not merely applied science. Instead, there is an interactive relationship where both science and technology affect each other. It is also clear that new technology develops predominantly from existing technology.

[3] Neo-classical economics provides an inadequate model for understanding the choice of technology. It ignores highly significant factors which affect technological change by concentrating on just two characteristics associated with technology (capital and labour), by assuming a single type of decision maker (the profit maximising entrepeneur) and by taking a largely a-historic view of the development of technology.

[4] The choice of technology is necessarily constrained by the international distribution of technological knowledge and power. Less than 3 percent of the world's R&D expenditure is spent in the Third World and only a small proportion of this is spent in Africa.

[5] The development of indigenous technological capability is important, both for the selection of transferred technologies, and for the adaptation and innovation of new technologies appropriate to local conditions.

[6] The origins of many of the current notions of appropriate technology, prevalent in aid policies, may be traced to that of intermediate technology with its a-political assumptions. Intermediate technology has often been seen as a solution to the problems of the underemployed rural poor, and the historical process which gives rise to rural deprivation, is ignored. The technological determinism in many of these notions results in a one-sided emphasis on the inevitable impact of technology on culture and society, and does not permit an evaluation of the interaction between political and economic structures, and technological change.

[7] The political economy approach, on the other hand, recognises that innovations in technology have seldom been neutral, but are part of the political process itself. Technology has a political function in society which is related to the distributon of power and the exercise of social control. On a material level, technology sustains and promotes the interests of a dominant social group, and, on an ideological level, technology acts in a symbolic manner to legitimise the dominant modes of instrumental and productive activity of a society.

[8] The political economy approach stands in marked contrast to modernisation theory which assumes that all societies follow the sames stages of development. Instead, emphasis is given to the

manner in which the relationship between industrialised countries and the Third World promotes underdevelopment. The approach advocated here should be differentiated from the structuralist and dependency schools of thought which are unable to explain adequately the nature of underdevelopment. Instead, an understanding of processes of social and technological change must be related more closely to an analysis of the mode and relations of production within and between societies.

This excursion into the literature on technology and development has served to highlight aspects of technological change which have received attention in the past. It has also indicated some of the weaknesses of this body of theory. By placing this critical review of the literature within an analysis of the concepts of appropriate technology, and by linking the discussion with a brief review of development theory, the need for a better understanding of the specific role that technology and technological change play in rural development in the Third World, has been shown. It is this aspect on which this thesis is focussed. This will be undertaken by means of an extensive case study of rural development in Lesotho, and through an examination of the factors governing the introduction and generation of technologies within the existing political and economic framework.

PART TWO

A CASE STUDY IN LESOTHO

CHAPTER THREE

THE POLITICAL ECONOMY OF LESOTHO

One of the key conclusions of the previous chapter was that technological change is intimately bound up with political economy. This is an interactive process in which economic and political factors govern the direction and nature of technological change, which in turn give rise to, and reinforce, political and ideological structures. The shift from pre-capitalist and traditional societies to those where capitalist modes of production are dominant, has inevitably involved the introduction of technologies which have radically altered the relationships between men and their tools, the means of production, and the products of their labour. Historically, colonialism and imperialism facilitated this process. Latterly, mechanisms such as international aid sustain this process of technological change in both a material and ideological fashion, within a global context of the expansion of capitalism. By examining Lesotho's current economic and political situation, and the historical developments which gave rise to it, it is hoped that the factors which govern and constrain technological change and rural development will be demonstrated.

The tiny, landlocked country of Lesotho in southern Africa presents itself, in many ways, as an excellent case study for research on technological change and rural development in the Third World. Lesotho is one of the poorest and least industrialised countries in the world (1). Poorly endowed with natural resources, a high propor-

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(1) The World Bank classifies Lesotho among the 33 least developed countries of the world [World Bank (1981a), Table 1].

tion of its population depends on subsistence agriculture, and manufacturing output is extremely low. Like many of the other poorer Third World countries, it is also increasingly dependent on international aid. In addition, Lesotho is wholly surrounded by the Republic of South Africa, and its enormous dependency on that country is reflected in the fact that more than half of its economically active male population work in South Africa as migrant labourers (2). The labour policy of the South African economy bars black workers and their families from permanent domicile in urban areas. At the same time it dictates that less than subsistence wages are paid to migrant labourers, thus ensuring that the Basotho retain a dual dependence on traditional, marginal agriculture and migrant labour.

If Lesotho's economy were to be assessed in terms of conventional aggregate economic indicators, it might appear that the country has fared remarkably well over the past decade. The average growth rate in Gross Domestic Product (GDP), over 1970-1979, was 7 per cent as compared with an average of 1.7 per cent for the group of low-income African countries [World Bank (1981b), p 144]. In 1977, the growth rate peaked at 14.1 per cent [Kingdom of Lesotho (1981), Third Five Year Development Plan (TFYDP), p 6]. These indicators, however, conceal the reality of Lesotho's economic predicament. As will become apparent below, most of this growth was attributable to factors beyond Lesotho's control. Changes in labour migration, agricultural production, and foreign aid presage serious consequences for Lesotho's future.

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(2) Other areas in Africa also experience massive labour migration, particularly Northern and Western Africa. It has been estimated that in Western Africa, about a million people are involved in labour migration, of whom about half go to Ghana and the Ivory Coast [van der Wiel (1977), p 17].

The economy of Lesotho, then, is structured by these three features:

[1] the export of workers to South Africa,

[2] subsistence agriculture, and

[3] dependence on foreign aid.

MIGRANT LABOUR

The dependence of Lesotho on the export of labour may be assessed partly in terms of the numbers involved in the migratory labour system, and partly in terms of the proportion of national income derived from migrant earnings.

Lesotho has an estimated population of 1.3 million people with a potentially economic active labour force of 630,000 , of whom just over half are male [World Bank (1981b), p 143; TFYDP, p 75]. Over half of the latter are absent at any one time as migrant labourers in South Africa; most Basotho males spend part of their working lives on South African mines (3).

The importance of migrant labour to Lesotho's economy cannot be exaggerated. In 1976, migrant earnings exceeded the country's gross

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(3) In a survey in the Thaba Tseka Project area, 82 per cent of males of 18 years and older reported having worked as migrant labourers [Thaba Tseka Mountain Development Project (1977a) p 7]. A noticeable example of the fact that almost all men in Lesotho have had experience of living and working in South Africa, is that the present Prime Minister, Chief Lebua Jonathan, himself worked for sometime underground in one of the gold mines near Johannesburg [van der Wiel (1977), p 9].
The average length of migrant labour contracts is 11 months, and the average duration of home-stay is four and a half months. Most Basotho begin their careers as migrants when they are 18 to 20 years of age and cease to migrate when they are about 45 [van der Wiel (1977), pp 32,46,47].

domestic product (GDP) by 30 per cent [Singh (1982), p 302]. Nearly three quarters of the real growth in per capita gross national product, in recent years, has been attributable to migrant remittances [Eckert and Wykstra (1980), p 7]. The proportion that migrant remittances contribute to the gross national product (GNP) is shown in Table 3.1, as well as other important trends in migrant labour, which have emerged over the past decade (4).

Some important features may be noted. The past trend of increasing labour migration has, since 1976, begun to be reversed (5). It is clear, from the figures released by the Chamber of Mines in South Africa, that a significant displacement of foreign workers has been taking place in South African mines and it is likely that the number of Basotho migrants will continue to decline in the future (6). It

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(4) The following points regarding these data should be noted:
(i) Lesotho's financial year runs from the beginning of April to the end of March. Thus, financial data for the years 1970, 1971, etc. reflect those for the financial years 1970/1, 1971/2, etc. The same applies to other financial data in this chapter.
(ii) At current exchange rates (November, 1982), there are approximately 2 Maluti to the pound Sterling.
(iii) A sizable proportion of migrants are at any one time present in Lesotho on rest and recuperation leave. If these were to be included, the total number of migrants in 1976, for instance, would have been approximately 200,000. Of these it is estimated that 180,000 were men and 20,000 women [van der Wiel (1977), p 16].
(iv) GNP, in Lesotho's case, is defined as GDP at Market Prices plus migrant remittances [TFYDP, p 9].
(5) The drop in migrant employment in 1974 was attributable to labour conflict in the mines, which resulted in a significant number of Basotho returning home before their contracts expired.
(6) In December 1973, foreign Africans constituted 80 per cent of the black labour force recruited for mines affiliated to the South African Chamber of Mines, and South Africans constituted the remaining 20 per cent. In December 1978, the respective proportions were 45 per cent and 55 per cent [Murray (1980), p 15]. South Africa itself faces severe unemployment problems among its African population, necessitating high priority measures to increase employment for its own citizens. Recent years have seen the rapid capitalisation of South Africa's productive forces with the result that even if fairly high growth rates are achieved they will not automatically translate into a high growth in employment. For example, in gold mining an increasing proportion of output is

	1970	1971	1972	1973	1974	1975	1976	1977	1978
No. of Basotho Migrants (1000's)	134	129	147	155	142	154.4	160.4	159.5	154.6
Basotho migrants in mines as % of total Basotho migrants	65	67	69	72	72	76	78	80	80
Migrant remittances (millions Maluti) 80/81 prices	40	42	52	91.9	121.5	162.2	165.2	168.5	157
GDP 80/81 market prices (millions Maluti)	140	147	157	159.2	159.9	172.5	210.5	247.1	-
GNP 80/81 prices (millions Maluti)	180	189	209	251.1	281.4	334.7	375.7	415.6	-
GNP/capita 80/81 Maluti	172	176	190	224	245	284	310	335	-

TABLE 3.1 : Lesotho Migrant Labour Statistics
Source: Lesotho Third Five Year Plan, pp 9,18.
Central Planning and Development Office, unpublished data.

is projected that the number of Basotho migrant labourers in South Africa will be halved by the year 2000 [Eckert and Wykstra (1979), p 23].

In the mid 1970s there were substantial increases in real wages for migrant labourers in the gold mines. After increases in the gold price, mine wages were raised, ostensibly to make underground mining more attractive to South Africa's own workers in an effort to reduce dependence on foreign sources of mine labour supply. The increase in

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being derived from highly mechanised surface operations as relatively high gold prices make it feasible to reprocess tailing dumps.

real mine wages was unprecedented. Lesotho, as the most extreme example of a labour exporter among the neighbouring countries, and with approximately three-quarters of its migrant labourers in mining, could not help being seriously affected. In 30 months (January 1973 to June 1976), mine wages increased by 500 per cent in monetary terms and by 330 per cent in real terms [Eckert and Wykstra (1980), p5].

It is interesting to note that the changes in the number of migrant labourers over this period were only slight. The absence of a response in the form of increased migrant numbers implies that the flow of labour migration to South Africa is solely determined by the employing industries in that country.

Table 3.1 also indicates that there has been a gradual concentration of migrant employment in the mining industry, which has increased Lesotho's dependence and vulnerability to the economic and political factors affecting a single sector of South Africa's economy.

Since 1976 the increase in mine wages has been more modest; in 1978, for the first time since independence, migrant remittances declined in real terms. It appears that mine wages are presently tied to the South African cost of living index, which is normally 1 to 1.5 percentage points lower than Lesotho's.

The significance of this decline for the economy of Lesotho is threefold. Firstly, migrant labour generates the source of a substantial proportion of recurrent government revenue and thus a decline in migrant remittances can contribute to a revenue crisis. Secondly, a decline in migrant labour results in further domestic unemployment. And finally, there are implications for rural poverty.

Government Revenue

Lesotho is part of the South African Customs Union (SACU) and customs revenue has played an increasingly dominant role in total government revenue (7). Total revenues have increased substantially from M29 million in 1975 to M125 million in 1981 (8). This increase has resulted, not from any broadening of the tax base, but from the growth of revenues from the Customs Union from 30 per cent in 1970 to 74 per cent in 1979 [TFYDP, p61]. The major source of purchasing power in Lesotho, and consequently the major determinant of customs revenue receipts through their effect on imports, is migrant labour remittances (9). A decline in remittances, or even a slowing of their rate of growth, may contribute substantially to a customs revenue and hence government revenue crisis. The extent of the interdependence between migrant remittances, customs union revenue and total revenue, is shown in Table 3.2.

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(7) There are no duties imposed on imports from South Africa (the main source of imports), but the country receives revenue from the SACU according to the following formula:

$$R = (i+p)/(I+P) \times (C+E+S) \times 1.42$$

where: R = revenue received by Lesotho; i,I = total value of imports into Lesotho and the Customs Union respectively; p,P = total value of dutiable goods produced and consumed in Lesotho and the Customs Union respectively; (C+E+S) = total collection of customs, excise and sales duties within the Customs Union.
There has been a complex and extended debate as to the benefits or disadvantages of Lesotho's membership of the SACU. See: Mosley (1978); Robson (1978); and Singh (1982).

(8) Unless otherwise stated, monetary figures quoted are at current values.

(9) Remittances typically constitute about 2/3 of migrant earnings and include direct remittances, deferred pay, cash in hand, and goods in hand.
For the period 1973 to 1977, the elasticity of demand for imports with respect to migrant remittances was 0.78 [Eckert and Wykstra (1980), p 7].

	1974	1975	1976	1977	1978	1979
Total government revenue (M million)	29.3	28.9	30	53.8	77.9	96.5
Total customs revenue (M million)	17.3	15.3	16.5	32.8	56.1	71.5
% customs revenue of total revenue	59	53	55	61	72	74
Total migrant contribution to customs revenue (M million)	-	-	-	16.7	24.8	28.9
% migrant contribution to customs revenue	-	-	-	50.9	44.2	40.4

TABLE 3.2 : Migrant labour contribution to customs revenue and total government revenue
Source : Lesotho Third Five Year Plan, Tables iv-4 and iv-5, pp 62,64.

Domestic Employment

The second factor of significance in this decline in migrant labour is its serious implication for unemployment in Lesotho. It is estimated that between 1980 and 1985 there is likely to be a reduction of 25,000 in the number of migrant labourers allowed into South Africa. Over this same period, the labour force within Lesotho will increase by 77,000 [TFYDP, p 75]. The economy thus has to provide for approximately 100,000 new jobs over the next five years if the present level of unemployment is not to increase. The magnitude of this task is reflected in the fact that, in 1980, a total of only 40,000 were employed in the entire modern sector, distributed as follows:

Mining and Quarrying	1000
Manufacturing and Industry	7500
Utilities	850
Construction	9000
Wholesale and Retail	7500
Transport	3000
Government	10000
Other	1150
Total	40 000

TABLE 3.3 : Employment by Sector
Source: Lesotho Third Five Year Plan, p 83.

The relatively small size of Lesotho's modern sector means that even higher growth rates in employment will add only relatively few new jobs during the Third Plan period (1980-5). It is apparent that modern sector growth, even at 6 per cent per annum, will provide only 13 per cent of the required jobs.

The manufacturing sector, in particular, has been unable to provide additional employment and, notwithstanding the activities of two organisations created by the government for the purpose of attracting investment and encouraging industrial enterprise, output has actually fallen in real terms over the 1973-8 period, and remains at only 2 per cent of GDP.

At the time of independence, Lesotho's industrial sector was extremely small. Only 23 manufacturing and construction enterprises were listed, employing a mere 1400 workers [Selwyn (1975)]. Since then a number of small industries have been established, mainly in joint ventures with the Lesotho National Development Corporation (LNDC).

The LNDC was established in 1967 on the advice of the Afrikaner industrialist Anton Rupert. Its primary task has been to encourage small scale capitalist industries. The Corporation is prepared to go to extraordinary lengths to attract foreign investment. In a publication entitled "The World's Longest Tax Holiday", the Corporation offers six tax free years and completely tax free allowances. In another publication, they refer to:

> "....the entire South African market on its doorstep.....There are no duties, restrictions, monetary or exchange controls. There is no problem about the repatriation of profits....There are concessions unique in Africa....the tax shelter provided by the government for new industries is one of the most comprehensive and generous in the world" [LNDC (n.d.)].

The LNDC provides mainly long term finance (including equity participation) whilst another agency, the Basotho Enterprise Development Corporation (BEDCO), has been set up to assist in the establishment and growth of small Basotho enterprises by providing loans and training facilities for Basotho businessmen. By June 1978, the LNDC had 38 subsidiary companies where it owned more than 50 per cent of the equity, and was associated with another 15 through minority shareholdings or long term loans. It is estimated that 80-90 per cent of Lesotho's industrial output is produced by enterprises supported by the LNDC. Industries have included pottery, umbrellas, sheepskin products, electric lamps, and furniture manufacturers. There has been little attempt to influence industrialisation strategy towards the manufacture of more appropriate products which might satisfy some of the basic needs of the population.

Industrialisation and employment creation have, on the whole, been unimpressive. In the First Five Year Development Plan (1970-1975), it was planned that the industrial sector would contribute most to

reaching the target of creating 2000 to 3000 jobs per annum. But actual employment creation remained far below this, as did the level of investment. The Second Plan included the estimate that Lesotho's male labour force would grow by 37,500 over the period 1975-1980. It was necessary, therefore, to provide 7500 new jobs each year if either an increase in migrant labour or an increase in unemployment was to be avoided. It was planned that most of these jobs would be created in the construction or agriculture sectors and that a total of 7000 new jobs would be created in industry, mines, commerce and tourism. The revised Second Five Year Plan indicates investment targets for these sectors which imply a high investment ratio of M11,700 per job. This is characteristic of Lesotho's industrialisation, which has generally been too capital intensive to absorb surplus labour. In the event, only 1697 jobs had been created in the first three years of the plan (Industry 609, Commerce 279, Tourism 127, and Mines 682), and in 1979 it was estimated that the number employed in the industry sector had grown to only 2800 [TFYDP, p 217].

One study has concluded that, on balance, there is a production cost disadvantage in the peripheral areas of southern Africa, such as Lesotho, in relation to South African metropolitan centres. The costs of utilities were found to be higher in the periphery, and there was little support for the common assumption that labour costs were, on average, lower here. There was also little evidence to suggest that capital was more expensive, but there were structural and institutional factors restricting its flow to the periphery. The study also showed that little effort was made to adapt techniques to local conditions [Selwyn (1975)].

Lesotho has only one known mineral resource with commercial potential

- diamonds. Traditionally the Basotho have used hand tools to dig for diamonds, but the government removed the diggers, in spite of vigorous protests, to less productive sites, in order to make way for prospecting by transnational mining groups. As a result, diamond exports declined from an average of 19,000 carat in 1969 to only 9000 carat in 1972 [World Bank (1975a)]. Rio-Tinto, Lonrho, and Newmont Mining were initially involved, but all decided not to pursue their investments, claiming lack of commercial viability. Subsequently, Anglo-American/De Beers took over the licence from Rio Tinto at Letseng la Terai and established a medium scale mine. But it has been claimed that deposits recoverable on economic terms will be exhausted within ten years.

In spite of these considerations, which demonstrate the peripheral nature of Lesotho's economy, the government stated, rather optimistically, in the Third Five Year Plan:

> "This sector [industry], although..... still small, appears to offer the best hope for achieving considerable growth for helping to effect optimum efficiency in several sectors, contributing to national income, creating domestic employment, and helping to reduce dependence on migrant labour" [p 215].

Lesotho is no longer going to be able to rely on migrant labour to absorb the increase in its labour force. As the numbers of migrant labourers allowed into South Africa decline, the problem of unemployment in Lesotho is likely to become acute.

There is one further effect that migration has had on the domestic employment situation. Migrants acquire new knowledge, skills, values and aspirations during their employment in South Africa. The skill distribution of Basotho migrants on the gold mines is shown in Table 3.4. The category "unskilled labourers" comprises labourers

Grade	Percentage	Classification
1	18	unskilled
2	17	
3	8	semi-skilled
4	45	
5	6	supervisory
6	3	
7	2	
8	1	training

TABLE 3.4 : Skill Distribution of Basotho Underground Workers on the Gold Mines
Source: van der Wiel (1977), p 24.

involved in work on pipes, tracks or timber, and general shaft personnel. The category "semi-skilled" consists mainly of drill operators and engine drivers. Those in supervisory positions include senior gang supervisors, haulage supervisors, senior team leaders and senior training instructors. However, most Africans are excluded from skilled jobs in South Africa, and thus the acquisition of skills and technical knowledge is in reality limited.

Skills and knowledge cannot function independently of the material conditions and the relevant social conditions in which they are appropriate. Skills and knowledge learned in the mines can appear useless and meaningless in the village context. The majority of migrants, in particular those who go to the mines, are engaged in occupations which can be of little use to Lesotho, as the country has negligible mining operations and no significant manufacturing sector. The value of skills and knowledge learned by agricultural migrants is also likely to be insignificant, as the majority of these farm labourers are employed on large, highly mechanised farms, applying techniques which are of limited use to Lesotho.

The most marked changes in Lesotho induced by the migrant's exposure to modern production methods have been imitative, not of productive innovation, but of South African metropolitan consumption patterns such as clothing, furniture, radios and the like. Occasionally the migrant becomes a petty shopkeeper on his return. In exceptional cases he may establish himself as a tractor contractor.

It is the experience of the writer, however, that although the relevance, to traditional social and economic activities, of skills learned by migrant workers is slight, they can be of significance to any development effort. The establishment of rural workshops, for instance, or the creation of labour-intensive road construction teams, all benefit from the slightly higher level of technical skills of returning migrants. One effect of the long term decline in the numbers of migrant labourers allowed into South Africa is that Lesotho will have to assume greater responsibility for the technical training of its citizens.

Rural Poverty

The reduction in the number of migrant labourers also has an effect on rural incomes. Over 90 per cent of the population still reside in rural areas. In the past, migration of labourers to South Africa was mostly from poorer or landless households. Migrant labour remittances were thus seen to constitute an effective means of ensuring relative equality of income distribution in rural areas. But recent evidence contradicts the conventional view that income is equitably distributed in rural areas (10). With the large increase in migrant

(10) Typical examples of the orthodox view are: World Bank (1975a) p 21; and The Second Five Year Plan*, p 3. Contradictory and more recent evidence is presented by van der Wiel (1977); Feachem et al

*Kingdom of Lesotho (1977 a)

wages in the mid 1970s, migrant remittances became the prime source of income for rural households. Surveys have determined that rural households with access to migrant remittances had an average income of M1500 per annum (at 1980/1 prices) and those without, an income of less than M400 per annum (including consumption of subsistence crops). It is expected that the proportion of rural households with no migrant income will rise from 40 per cent in 1980 to 67 per cent by 1985. The income figures quoted above should be compared with an estimated poverty datum line in 1980 of M1000 per annum [TFYDP, p 20]. In spite of fairly high growth rates in GDP in the 1970s, there is evidence that the real incomes of the poorest 20 per cent of rural households has declined significantly [TFYDP, p 124]. It is likely, therefore, that as the real value of migrant remittances declines over the foreseeable future, many new rural households will be living in absolute poverty. This situation has been greatly exacerbated by the failure of attempts to raise Lesotho's agricultural output.

AGRICULTURAL PRODUCTION

The second important factor structuring Lesotho's economy - subsistence agriculture - is profoundly affected by patterns of labour migration.

One of these effects, which receives much comment, is that the departure of able bodied men has resulted in a decline in male labour available for agriculture and that measures for long term investment in land, which involves heavy manual work such as soil conservation

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(1978); and Murray (1978).

and terracing, have been neglected [Singh (1982), p 303]. However, recent research has shown that the proportion of the population involved in labour migration has remained approximately constant throughout the century (at 12 to 13 per cent). This implies that the absolute size of the domestic labour force has increased as the total population has grown [Eckert and Wykstra (1980), pp 2,3]. Certainly soil erosion is a major threat to Lesotho's agriculture and it is estimated that 2 per cent of its topsoil is washed away annually [TFYDP, p 2]. A more likely relationship between labour migration and soil erosion is the tendency for returning migrants to invest in cattle, which has contributed to overgrazing with consequent soil erosion.

Of more importance is the seminal fact that the Basotho cannot support themselves solely from the existing land base and have, over the past century, grown increasingly dependent on the earnings of migrant labour in order to survive. Agriculture has come to be perceived as a marginal economic activity, necessary only as a supplement to migrant earnings and as a means for providing food reserves. This is especially true of recent years, where the increases in migrant earnings have resulted in even less effort being devoted to agriculture. Table 3.5 presents some estimates of the sources of rural household incomes (11).

At the beginning of the decade, remittances contributed approximately

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(11) Two existing studies provide data on the source of rural household incomes. The first is based on field surveys conducted in 1967-69 [Monyake (1973)]. The second is a study based on primary data from baseline surveys in the Thaba Tseka, Phutiatsana, and Thaba Bosiu project areas [van der Wiel (1977)]. These two studies thus span the years of dramatic increases in mine wages. Eckert and Wykstra (1980) have combined this data.

		1967-9	1974	1975	1976	1977	1978
Crops	Maluti	-	73	57	47	111	129
	(%)	-	(14.6)	(8.5)	(6)	(11.6)	(12.3)
Livestock	Maluti	-	76	82	90	94	102
	(%)	-	(15.1)	(12.2)	(11.5)	(9.9)	(9.7)
Agriculture sub-total	Maluti	120	149	139	137	205	231
	(%)	(40.8)	(29.7)	(20.7)	(17.5)	(21.5)	(22)
Off-farm in Lesotho	Maluti	61	62	75	92	114	139
	(%)	(20.7)	(12.4)	(11.2)	(11.7)	(11.9)	(13.3)
Sub-total Lesotho	Maluti	181	211	214	229	319	370
	(%)	(61.6)	(42.1)	(31.8)	(29.2)	(33.4)	(35.3)
Migrant Remittances	Maluti	113	290	458	554	635	679
	(%)	(38.4)	(57.9)	(68.2)	(70.8)	(66.6)	(64.7)
TOTAL	Maluti	294	501	672	783	954	1049

TABLE 3.5 : Composition of Rural Household Income
Source: Eckert and Wykstra (1980), Table 7.

40 per cent of rural household incomes. By the end of 1976 this had increased to 71 per cent. The remittance component alone in 1976 exceeded the total household income estimate of just two years earlier. With a change of this magnitude one would expect a rapid albeit temporary readjustment in domestic productive activities. This is precisely what happened in the crops subsector. The very low figure for crop incomes in 1976 is a result of an abrupt decline in planted and harvested area, which reduced the overall production of maize and sorghum to the lowest levels in recent history. In part, therefore, the reason that migrant remittances contributed so high a proportion of household incomes in 1976, is because remittances had grown so rapidly that the incentive to seek incomes from other

sources had been substantially reduced. The production of crops, where investment decisions are made anew each season, suffered the most serious neglect. Food requirements were increasingly met by imported commodities purchased with remittances. Such a substitution of purchased food for home produce is particularly easy when a country already imports much of its food requirements and food marketing channels are well established. Official estimates for crop production are shown in Table 3.6 and data for crop yields in Table 3.7.

Crops	1950	1960	1970	1973	1974	1975	1976	1977	1978
Maize	179.4	163.4	129.3	140.9	126.4	115.5	92.6	111.5	122.3
Sorghum	56.2	68.4	82.6	84.8	68.4	55.4	46.8	62.0	54.1
Wheat	49.2	67.7	106.4	82.1	63.4	59.7	43.9	45.6	38.0
Peas	8.5	17.6	12.2	11.8	14.4	13.1	9.7	5.7	6.6
Beans	2.5	5.6	16.4	21.3	30.7	35.1	17.3	14.3	11.9
Area Planted	295.8	322.7	346.9	340.9	303.3	278.8	210.3	239.1	232.9
Area Harvested	-	309.8	292.5	319.5	25.8	224.7	186.2	219.0	214.7
Area 'Failed'	-	12.9	50.4	21.4	47.5	54.1	24.1	20.1	18.2

TABLE 3.6 : Area Planted to Field Crops in Lesotho (000's of hectares)
source: Eckert and Wykstra (1980), Table 8.

Year	1960	1970	1973	1974	1975	1976	1977	1978
Maize	687	514	945	652	579	1568	1408	1058
Sorghum	783	688	1008	684	555	1467	1447	1345
Wheat	850	544	745	823	799	1373	1359	952
Peas	683	365	706	580	569	991	1018	1204
Beans	243	224	381	477	292	143	974	822

TABLE 3.7 : Crop Yields (kg/ha)
source: Eckert and Wykstra (1980), Table 9.

Concurrent with the sharp drop to 210,000 planted hectares in 1976, recorded yields soared to unprecedented levels. This phenomenon has been sustained through the last three annual surveys and has become one of the more controversial issues regarding official statistics on the performance of Lesotho's economy (12). Two possible explanations for these increased yields have been suggested. Firstly, when faced with an incentive to reduce or de-emphasise cropping, the rational farmer will leave his least productive fields fallow first. In Lesotho, with its wide variety of soil types, a great many farmers had the option of restricting their cropping to good land and letting their marginal (or distant) fields return to grass. Secondly, having reduced the total cultivated area by nearly 40 per cent in three years, farmers were able to concentrate their inputs on remaining areas. The combination of much higher levels of inputs per hectare being applied to the more fertile and responsive soils is one possible explanation for the sudden and sustained increase of the magnitude recorded for crop yields.

A more cynical analysis might suggest that the data for the increased yields in 1976 coincided with Lesotho's tenth anniversary since independence, and that there was a great deal of political concern to demonstrate that Lesotho's agricultural productivity had improved. Certainly such an abrupt change in the data is difficult to explain

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(12) Some changes in sample coverage were made in 1976 with the intent of including crops grown in the gardens next to houses in national totals. However, recent re-examination of the primary questionnaires indicates that the area of the major crops (as opposed to garden vegetables) included in the farmstead plots is nominal and could not have made more than a 3-5 per cent change in the national yield averages. None of the other changes made in 1976 (such as the conversion to metric measurements) should have had any impact on recorded yields. Consequently, the abrupt change remains unexplained and has cast serious doubt on the validity of the data.

entirely in terms of unprecedented (and unlikely) increases in productivity (13).

It is sobering to note that, as migrant remittances have begun to decline (in real terms), the area planted has begun to increase, with a corresponding decline in yields. This is consonant with the long term decline in yields which has meant, over the years, that Lesotho has been increasingly unable to meet its own food requirements. Domestic production of foodstuffs accounts for only one half of domestic consumption, with the remainder made up of imports and food aid (14).

Table 3.8 indicates the agricultural sector's falling share of GDP from 42 per cent in 1967 to 37 per cent in 1977, and Tables 3.9 and 3.10 demonstrate the large increases in food imports in recent years.

While the contribution to GDP from livestock returns has remained relatively constant, crop production returns have decreased as a result of stagnant or, in some cases, declining production. Stagnant agricultural production is due in part to the deteriorating land base. The climate is such that if the grassland and cropland are not properly managed, there will be excessive soil erosion. This has been the situation for a number of years and a large number of ero-

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(13) Yield data from rural development projects are consistently lower than the figures given for the national averages. For example, in the Thaba Tseka project area in 1977/8, maize yields were 503 kg/ha and wheat yields 419 kg/ha compared with purported national yield averages of 1408 kg/ha and 1359 kg/ha for the same crops respectively [Thaba Tseka Rural Development Programme (1979a)].

(14) The estimated gross revenue from crop production (or equivalent values for non marketed crops) in 1978 was: field crops - M11.4 million; fruit crops - M4.4 million; forage crops - M79,000; and vegetable crops - M2.2 million [Ministry of Agriculture (1978), p VI-2].

	1967	1973	1974	1975	1976	1977
Agriculture	41.9	49.5	44.0	39.4	43.1	36.8
(crops)	(25.1)	(27.8)	(20.7)	(15.8)	(25.2)	(20.6)
(livestock)	(16.8)	(21.7)	(23.3)	(23.6)	(17.9)	(16.2)
Mining and Quarrying	2.5	0.3	1.5	2.0	2.5	2.1
Manufacturing	2.1	2.7	4.4	4.3	3.5	1.9
Building and Construction	2.2	2.6	1.4	3.1	4.8	9.4
Wholesale and Retail	12.8	9.8	14.9	14.4	13.5	12.2
Catering	0.3	3.0	3.3	5.2	5.5	6.2
Transport and Communications	1.4	2.6	2.9	2.5	2.6	2.6
Ownership of Dwellings	15.3	11.5	11.9	11.6	9.9	10.7
Central Government	16.3	10.0	8.7	11.2	10.4	13.4
Other	5.2	8.0	6.9	6.2	4.2	4.8
Total	100	100	100	100	100	100

TABLE 3.8 : Per cent share of GDP (at factor cost)
Source : Lesotho Third Five Year Plan, p 8. [Kingdom of Lesotho (1981)]

	1974	1975	1976	1977	1978
Food and live animals mainly for food	17	21.9	37.9	43.1	55.4
Beverages and Tobacco	3.4	5.2	7.9	9.2	12.3
Crude Materials	.5	.8	1.3	2.1	2.1
Fuel	5.4	7.1	11.7	17.6	17.9
Oils and Fats	.8	1.1	1.6	1.3	1.6
Chemicals	4.2	6.3	9.5	10.5	13.4
Machinery	8.4	12.8	22.7	24.4	32.3
Manufactured goods	42.1	62.0	86.9	90.8	99.3
Miscellaneous				0.3	2.6
Total	81.7	117.3	179.6	199.4	237.0

TABLE 3.9 : Value of imports (millions of Maluti)
Source: Annual Statistical Bulletin 1979, Table D.3

	1975	1976	1978	1979	1980
Commercial Imports	54,745	94,935	133,196	114,530	152,380
Food Aid Imports	10,168	13,150	16,841	19,902	28,250

TABLE 3.10 : Imports of Major Cereals (metric tons, grain equivalent)
Source: Bryson (1981), p 19.

sion gullies are evident, particularly in the lowlands. The worst erosion, however, is sheet and rill erosion from both cropland and grassland. This is caused by lack of sufficient cover on the grassland coupled with poor farming practices which greatly reduce the plant cover, as well as the amount of residue returned to the soil. There is no doubt that uncontrolled grazing is the major cause of erosion on both grassland and cropland. Some 1,800,000 hectares are used to support more than one million large livestock 'grazing units', exceeding recommended carrying capacity for well-managed rangeland for Lesotho by 160 per cent [USAID (1980), p 4.]. The extensive nationwide overstocking has not only caused vast sheet erosion from loss of vegetation cover, and gully erosion along overused cattle trails, but it has caused a decline in the quality and productivity of livestock. This has been manifested in lower quality wool and mohair products (Lesotho's major exports), and low reproduction rates for all types of livestock (15). The importance of these factors becomes apparent when it is realised that more than half of all farm households own some grazing stock, and that just under one half of the total value of agricultural production is derived from the

(15) Annual Statistical Bulletin 1979, Table D.11.

livestock sub-sector.

The sudden increase in migrant remittances has brought about important changes in the livestock sub-sector. The most important of these was a sudden reversal of Lesotho's historical role as a nett exporter of livestock.

About 70 per cent of agricultural production is for on-farm consumption and the balance for the market (16). In 1977, live animals and animal products made up about 40 per cent of Lesotho's exports [TFYDP, p 15]. The number of cattle exported declined from 11,400 in 1970 to 570 in 1978, while cattle imports increased from 4700 to 57,800 over the same period. Similar trends may be observed with other livestock, particularly sheep and goats (17). As a consequence Lesotho's balance of payments position has worsened and it now has a large and growing deficit in the balance of trade, which is offset mainly by remittances from migrant workers (62%), Customs Union revenue (17%) and aid flows (13%).

One of the effects of Lesotho's position as an economic enclave is ready access to South African markets. Lesotho's demand for goods and services can be readily met by the highly developed economy of South Africa. The result is a high propensity to import and strong disincentives for domestic production. Table 3.11 presents data on the aggregate value of trade since independence. Both imports and exports have increased dramatically in value. Exports have grown

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(16) The estimated annual gross market values (or equivalent values for non-marketed products) in the base year 1970 (but in 1978 prices), was: animal products - M15 million; fresh meat - M6.6 million; draft power and transport - M3.3 million; and live exports - M2.1 million [Ministry of Agriculture (1978), p VII-3].
(17) Annual Statistical Bulletin 1979, Tables D.6, D.14.

slightly faster in percentage terms, but due to their small absolute value, have not offset absolute changes in the value of imports. Consequently, since 1970 the trade deficit has grown at the rate of 35 per cent per annum, if measured at current prices, and at 21 per cent per annum, if measured in constant 1970 prices.

Year	Imports	Exports	Trade Balance
1966	22.9	4.4	-18.5
1967	23.8	4.2	-19.6
1968	23.9	3.4	-20.5
1969	23.9	4.1	-19.8
1970	22.9	3.7	-19.2
1971	28.0	2.2	-25.8
1972	43.0	6.1	-36.9
1973	64.6	8.8	-55.8
1974	81.7	9.8	-71.9
1975	122.8	9.2	-113.6
1976	178.8	14.6	-164.2
1977	195.7	12.2	-183.5
1978	238.5	28.3	-210.2

TABLE 3.11 : Value of Imports and Exports (millions of Maluti).
Source: Customs and Excise Department.

Public debt has also increased, and total loans currently outstanding with the government have risen to M71 million, many of these being short term, relatively expensive, commercial loans (18).

To summarise - Lesotho's social and economic development options are severely constrained by its geo-political and economic dependence on South Africa. It remains extremely vulnerable with regard to its main sources of national income - namely, migrant remittances and

(18) Lesotho Third Five Year Plan, p 71.
Lesotho's public debt has increased from $8.1 million in 1970 to $51.8 million in 1979 [World Bank (1981b), p 160].

customs union receipts. Indeed, all indications are that revenue from these sources is diminishing, and if this process continues it will necessitate major structural changes in Lesotho's domestic economy. Attempts at creating significant domestic employment have been largely ineffective: only modest increases have been achieved in the construction and government sectors. Agricultural production continues to stagnate, if not decline, and the balance of trade deficit and public debt have substantially increased. With a rural population growth rate of 2.3 per cent per annum, and deteriorating terms of trade of 3 per cent per annum, rural poverty is steadily worsening [TFYDP, p 123].

On the other hand, the apparent increases in yields in the mid-seventies, which coincided with a fall in planted area and a concentration of agricultural inputs, might seem to indicate that agricultural productivity could be increased. With the reduction in labour migration, Lesotho's rural population will be forced to try and generate increased incomes from agriculture in order merely to survive. The challenge for the development effort lies in providing appropriate means and knowledge to support farmers in this endeavour.

HISTORICAL ROOTS

The decline of agricultural production in Lesotho has been attributed to many factors: population pressure, which has created an acute shortage of land and which has resulted in the exploitation of marginal land unsuitable for agriculture; the land tenure system which has inhibited farmers from investing in long term conservation measures; deterioration of the land through mono-cropping, overgrazing and erosion; and the vicissitudes of climate such as drought, hail and

frost, all of which are common in Lesotho.

However, to concentrate exclusively on these factors is to ignore the clear historical roots of Lesotho's current economic problems. Lesotho has not always been in as disadvantaged a situation as the above analysis of its contemporary situation would indicate. Early travellers described Basutoland as "the granary of the Free State and the Cape Colony" and Casalis, a French missionary, wrote that "habits of serious and diligent husbandry are to be sought for, not among the Boers, but among the Basuto" [Casalis (1861)].

Writers on Lesotho's contemporary economy have not always given due emphasis to the early history of the Basotho, and have attempted to explain poverty in the rural periphery by recourse to commentary on the failure of African culture to innovate or respond to changing conditions in the sub-continent. For example, one prominent ethnographer has written:

> "The Basotho are not agriculturalists by tradition and rather grudge the amount of time they have to spend on their lands" [Ashton (1967), p 120].

It has been argued that in Lesotho, "the facts of rural life are both [the] cause and effect of non-development" [Wallman (1972)]. But the crux of these arguments, that the "lack of development" in Lesotho is the result of the economic pessimism which dominates the rural Mosotho's world view, largely ignores the political and economic forces which historically have conditioned the distribution of resources. Economic historians have recently begun to argue that:

> "....the transition from granary to labour reserve makes it clear that the appropriate question is not 'Why are the Basotho <u>still</u> poor?' but 'How have the Basotho <u>become</u> poor?'" [Murray (1980), p 4].

A brief survey of the economic history of the Basotho will enable a

better understanding of Lesotho's current political economy (19).

Early History

The history of the Basotho nation, as we know it today, dates back to the early nineteenth century (20). Most accounts begin with the rise of Moshoeshoe, commonly regarded as the "father of the nation". Initially, Moshoeshoe was a minor chief established with a following of around 2000, near to present day Butha Buthe in northern Lesotho - an area which in the 1820s became embroiled in a period of wars and immense turmoil known as the lifaqane. These wars originated with the Zulus, who in their attempt to gain dominance in the region, forced a number of minor groups to flee or migrate. These groups in turn plundered and entered into war with the Sesotho speaking groups on the southern highlands. Moshoeshoe was defeated in his first encounter with these expanding clans, after which he led the retreat of his people to a natural mountain fortress, Thaba Bosiu (21). This

(19) Sources of information in this section come mainly from Ashton (1952); Casalis (1861); Arbousset and Daumas (1846); Germond (1967); Ellenberger (1969); and Theal (1964). Unfortunately few of these works deal specifically with the economic history of the Basotho. It is relevant to note here that as the limitations of political independence and the reality of neo-colonialism have become clear in recent years, there has been a growing emphasis amongst historians on the need to return to the level of production and develop a history which can explain economic change. Thus students have begun to examine the material formations of pre-colonial African societies, the economic impact of missionary penetration, of mercantile capitalism, colonialism and imperialism, and the processes whereby African social formations were integrated into the expanding world capitalist economy. Kimble (1978) represents one of the few studies on the Basotho in this genre, and this section draws heavily on her research. Other work on the economic history of Lesotho includes Leys (1973), Spray (1975), Kowet (1978), and Murray (1980), which stand in marked contrast to the earlier work of Williams (1970) and Wallman (1972), which assumed a state of non-development in the country.

(20) The people of Lesotho are referred to as Basotho (one person, a Mosotho) and speak Sesotho. Lesotho was referred to as Basutoland during the period of colonial rule, 1871-1966.

(21) translated - Mountain of the Night.

migration, in 1824, proved to be a strategic move of inestimable value. Thaba Bosiu served as a superb fortress, and the surrounding valleys and plateaux were ideal for crop and livestock production. His followers began cultivating the surrounding area. Other groups joined them, attracted by the security of the situation and the fairness and sound judgement, which increasingly became the hallmarks of Moshoeshoe's leadership. They soon learned the value of guns and horses from initial clashes with nomadic groups, such as the Korana, and within a decade and a half Moshoeshoe could lay claim to a wide extent of territory stretching from Butha Buthe in the north and Thaba Nchu in the west, to the confluence of the Mohokare (Caledon) and Senqu (Orange) rivers in the south (22). By this time his following numbered close on 80,000.

The scale of these developments is impressive. Within three decades Moshoeshoe's kingdom was being described by British colonial officials, as "the key to all the South African politics so far as natives are concerned" (23).

Productive Base

The Mohokare valley was ideally suited to the simultaneous expansion of both cultivation and pastoralism. An early traveller wrote:

> "The country is well watered; the air keen, bracing, and healthy, very cold in the winter, and moderately warm in the summer season, well adapted for rearing cattle and agriculture; a country capable of supporting a numerous population and easy of defence" [Hall (1858), p 301].

In this early period, the Sesotho economy was based on six main branches of production : pastoralism, cultivation, hunting,

(22) See the maps in Appendix I.
(23) Theophilis Shepstone, quoted in Kimble (1978).

gathering, handicrafts and metal-working, and military activity [Kimble (1978), p 20]. All these activities were essential for the satisfaction of basic needs of the Basotho, such as food, clothing, tools, and weapons. With the exception of metal working, there was little specialisation of labour between the different branches of production, and every household was drawn into every kind of productive activity. Women's labour time was expended entirely in agriculture, gathering, handicrafts, and domestic tasks within individual homesteads. There were limited co-operative and reciprocal methods of labour organisation in some agricultural activities such as harvesting and winnowing of grain. Men contributed directly towards the reproduction of the homestead in that they were responsible for the production of clothing and tools, for stock rearing, hunting, and some agricultural tasks like ploughing. But much of their labour time was expended in direct labour service for their chiefs, in the agricultural, hunting, and military branches of production.

An early social division of labour emerged whereby the chieftainship was freed from directly productive labour. Moshoeshoe's clan, the Bakoena, were able to establish lineage rights of seniority, effectively gaining control of the chieftainship and fairly extensive powers over surplus appropriation. Through a system of "placement", Moshoeshoe succeeded in appointing his sons and relatives to key chieftainships. The political superstructure which evolved under Koena hegemony was a hierarchy of delegated authority. The chieftainship consisted of five main levels: morena e moholo (the sovereign, or king, later described by the colonial authorities as the Paramount Chief), morena (a principal subordinate or ward chief), morenana (sub-chief), ramotse (headman), and rametsana (village head-

man, the lowest level of authority). Every homestead settled within the territory was integrated into this hierarchy, and through his ramotse owed allegiance to his morena and morena e moholo.

The morena e moholo held the land in trust for all the people, and allocated areas over which the subordinate chiefs exercised control, and to which they asserted territorial claims on behalf of the kingdom. Every subordinate chief parcelled out land to his sub-chiefs,who in turn allocated land to the villagers through their headmen. The village head was responsible for allocating grazing and arable rights to each of his followers, but, particularly with regard to the common pasturage, he remained in strict subordination to the chief of the whole district. Each family head was entitled to a portion of arable land proportionate to his needs. In later times, it became customary to limit the allocation per household to three parcels of land, each measuring about one hectare. The direct producers did not "own" the land, nor could they dispose of it as they wished, or consider it to be their hereditary property.

The Koena lineage was able to maintain its dominance mainly by virtue of its control of cattle. Through the mafisa system the chief's vast herds of cattle were lent to homesteads which would herd, milk, and breed them for him, but could not exchange or otherwise dispose of their charges. The relationship was one which bound the client to the chief for as long as he held the cattle, and he was expected to perform "gratuitous service" for the owner when called upon [Kimble (1978), p 70].

Another important and institutionalised form of labour-service due from every homestead head to the chief took the form of the annual

matsema parties. Every adult able-bodied male was obliged to participate in such work parties on certain fields belonging to the chiefs. Furthermore there were fields known as tŝimo ea lira which were worked by the men in their regiments at least three times a year at the seasons of ploughing, weeding, and reaping.

Matsema obligations also extended into other areas of production. Access to reeds and grasses, for thatching and weaving, was regulated by the maboella system and mediated by tribute labour. Maboella was a system whereby the chiefs controlled the use of communal winter grazing areas near to villages, and also reeds and grasses, and wood for fuel. All such scarce resources were highly valued so that no one could cut down trees or thatch a house without the chief's consent. In the season when grasses and reeds are cut, each subject was expected to take a bundle to the chief before collecting for himself. The chiefs also assumed rights over the national and regional hunting expeditions. Participation in military expeditions, led by the chiefs, was an obligation for every adult male and most of the captured flocks and herds became the property of the chief.

The appropriation of the fruits of labour-service in these forms was the primary means whereby the chiefs extracted surplus from their adult male followers. The wealth which a chief accumulated from such sources was realised in three different but interconnected ways. Firstly, he could make use of it in the interests of his own lineage. He could use the increase in mafisa calves, or the fruits of a cattle raid, to acquire more wives for himself and his sons. Cattle were central to the Sesotho social structure. Not only were they a means of subsistence (through milk, meat, skin products, transport, and draft power), but they were the primary measure of wealth and bohali

or bride price. The more wives and children a chief had, the more fields and labour he had access to for the reproduction of his own homestead and lineage, and the more male children that were produced, the more members of his own lineage would eventually be "placed". Secondly, the surplus could be redistributed, and, thirdly, it could be exchanged on the commodity markets of the subcontinent.

Penetration of Mercantile Capital

The emergence of this ruling lineage was an important precondition for the extensive relations of exchange which were to develop between the Basotho, the white settlers and mercantile capital. Although this lineage never established any kind of monopoly or exclusive control over trade, it was primarily its demand for certain commodities (cattle, guns and horses), central to the continued reproduction of its position of supremacy within the social structure, which gave rise to commodity production on a significant scale.

The trade of commodities began soon after the arrival of white settlers and missionaries. In 1830, Moshoeshoe invited three members of the Paris Evangelical Missionary Society (PEMS) to settle in his territory. These settlers were among the first to leave written accounts and records of events at that time. The first substantial account of the Basotho was made by Eugene Casalis, who recorded that the Basotho were prosperous, that milk and meat formed a large part of their diet, that grazing for their animals was readily available, that there was plenty of land for all, that crops were also important and were cultivated chiefly by women, that when the soil became exhausted it was referred to as having "grown old" and was left fallow for a period of time, that the chief crop was mabele (sorghum),

that the fields were worked with moguma (iron hoes), and that the Basotho were predominantly self-sufficient, with only limited bartering with other clans [Casalis (1861)].

The first Boers (24) began to arrive in the plains to the west of the Mohokare Valley in the 1830s and Moshoeshoe allowed them to graze their cattle on his lands. It soon became apparent, though, that there was a fundamental misunderstanding over the question of land ownership. It was a Basotho custom to provide foreigners with hospitality and it was in this spirit that Moshoeshoe granted grazing concessions on land traditionally used by the Basotho. All land was held in trust by the chief for his people and was distributed according to carefully established needs. For the Boers, individual title to land was a clear and unambiguous concept formalised by boundary lines. As more Boers arrived, conflict was inevitable. Moshoeshoe made his position quite clear in a letter of protest to the British:

> "The selling or renting of lands has hitherto been a practice wholly unknown to us.....From the Boers' first appearance until now I have never ceased to warn them that I viewed them as mere passersby, and although I did not refuse them temporary hospitality, I could never allow them any right of property. I have rented no place to them and I have abstained from receiving any renumeration for the use they have had in parts of the land.....Notwithstanding my protestations against it, many of the the migrants have transferred their supposed right to others without my knowledge or consent" (25).

These conflicts were eventually to have a long-lasting and deleterious effect on the Sesotho economy, for although one of the outstanding achievements of Moshoeshoe in ensuing years was the prevention of the establishment of European farms within Lesotho, he could not

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(24) The Boers were farmers of mainly Dutch extraction, who in the 1830s began to trek away from the Cape Colony into the interior of southern Africa, in order to escape increasing British hegemony.
(25) Quoted in Theal (1964), vol 1, p 85.

prevent ultimately the confiscation, by the Boers through military conquest, of large tracts of land in the West of the territory, which had been understood by the Basotho to be under their control.

As the Boers began to claim permanent title to the lands they grazed, particularly in the triangle formed by the Mohokare and Senqu rivers, Moshoeshoe heeded his missionary advisors and sought relief from the British. The crowded events of the ensuing years, up to the annexation of Basutoland in 1871, are outlined below.

In response to Moshoeshoe's request, the governor of the Cape Colony, Sir George Napier, in 1843, created a buffer zone in the disputed area. The treaty defined the boundaries of Lesotho for the first time. But the Basotho were unfamiliar with strict boundary lines. Moshoeshoe expressed the traditional view by stating, "My lands are where my people live" [Lye and Murray (1980), p 63]. These different concepts of territorial rights were to contribute to the ensuing conflicts. The Napier treaty was renewed by the new governor, Sir Harry Smith, but the conflict continued. Smith visited the area in dispute and in 1848 declared both the Orange River Sovereignty and Basutoland, sovereign areas under the Queen. The Boers retaliated and occupied Bloemfontein, the seat of the British Commissioner, but the town was later retaken by the British. Moshoeshoe was now wary of both the Boers and the British. Conflict between the Boers and the Basotho continued. A new demarcation line was drawn up by the British Resident Commissioner, Major Warden, which confiscated a large area of Moshoeshoe's land. The new governor at the Cape blamed Moshoeshoe for raids across the line and demanded compensation. When Moshoeshoe refused, a British armed force was dispatched, but was later forced to withdraw. In 1854, Britain handed the sovereignty of

the Orange Free State to the Boers. In spite of initial peace between the Orange Free State and Moshoeshoe, the Boers declared war in 1858 and aimed to push the Basotho back from the disputed areas. But Moshoeshoe was able to withstand the assault and the war was temporarily halted by a British mediator. Moshoeshoe, ageing and unsure as to how much longer he could defend his territory, asked for British protection in 1860. The British vacillated and in 1865 the Boers launched their most powerful attack yet. The Basotho were badly defeated and lost land well beyond the disputed areas. Many of the people were close to starvation following the confiscation of cattle and food supplies. The Boers closed down mission stations in the occupied areas and many Basotho were forced to migrate well beyond the Mohokare river. Finally, in 1868, the Basotho were proclaimed subjects of the Queen by the governor at the Cape, Sir Philip Wodehouse. Much land was ceded to the Orange Free State and the boundaries of Lesotho were greatly reduced from the area originally understood to be under Moshoeshoe's control. In 1845, Moshoeshoe had estimated that he controlled 440 villages south of the Mohokare river and 260 to the north [Theal (1964), vol 1, p 85]. By 1860, he had lost all those on the Orange Free State side of the river. Moshoeshoe died in 1870 and a year later Basutoland was annexed to the Cape without the leaders of the territory having been consulted. Thus, in the period leading up to annexation, the British appeared to have been willing to collude with the Boers when their own interests were not directly threatened. As Casalis reports:

> "You are civilised, said Moshesh to me one day.....You do not steal cattle, it is true, but you steal entire countries, and if you could, you would send our herds to pasture in the clouds" (26).

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(26) Quoted in Kimble (1978), p 86.

After annexation the Basotho were subject to new laws and taxes about which they were seldom consulted. This was in spite of Moshoeshoe's famous letter to Wodehouse in which he made clear that he did not want any Basotho laws changed without the prior approval of the Basotho Council, and that the Queen would only rule his people through him. Later the Basotho were forbidden to carry guns, in spite of their continued fear of the Boers who were still on their land. This led to the 1880-3 gun war against the Cape Government, which eventually ceded control of Basutoland to Britain in 1884. For the next 80 years Basutoland was administered as a British Protectorate.

The period up to the annexation saw the introduction of new techniques of production and increasing trade. Horses were introduced in the 1820s [Sanders (1975), p 9]. The missionaries encouraged the use of wagons, the introduction of wheat, vegetables, fruit trees, Angora goats, sheep, and most important of all, the plough [Germond (1967), p 320]. The rate of innovation appears to have accelerated substantially in the late 1860s and 1870s, after peace had been imposed. It has been noted that:

> "...the whole economy of the Basotho changed in the space of a few years and in 1872 the Governor's Agent reported that for the first time the hut tax had been paid entirely in cash.....The primitive hoe cultivation was replaced by ploughing and 3700 ploughs were sold during a period of five years.....In 1871, there were 20 trading stations in Basutoland.....and during the year 1873 the number increased to 50 to supply the growing requirements of the Basotho" (27).

The adoption of the plough permitted a radical change in the economy of the Basotho as they began to trade in grain. Export earnings from the sale of grain were used to buy European goods, such as clothes,

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(27) Walton (1958), p16, quoted by Turner (1978), p 62.

ploughs, furniture, and guns.

The production of commodities which occurred in Lesotho prior to annexation was ultimately due to the presence and expansion of mercantile capital in southern Africa (28). The precise manner in which mercantile capital penetrated into the southern highveld at this time was complex, and took different forms. The arrival of the white farmers with a demand for grain in the early 1830s acted as an important catalyst in the production and exchange of agricultural commodities by the Basotho. Exchange between these two groups at first took the form of direct barter, but, increasingly, itinerant and fixed traders with links in the Cape Colony began to act as intermediaries for such exchanges.

Another aspect of the penetration by mercantile capital can be found in the presence of the Paris Evangelical Missionary Society (PEMS) missionaries in Lesotho. In their activities and ideological impact they epitomised the ambivalent and contradictory effects of mercantile capital on Sesotho society. The missionaries worked to stimulate production on the part of individuals, in an attempt to undermine the relations of personal dependence existing between chiefs and their followers and the various customs which maintained and perpetuated these relations. By propagating notions of private property, and the right of the direct producer to dispose of his own products, and by encouraging a homestead to cut its links with the key processes of reproduction (matsema, mafisa, and bohali) they were aiming at the dissolution of the existing framework of social

(28) The sole function and condition of existence of this form of capital is to promote the exchange of commodities and to act as a mediator in the realm of circulation between the different spheres of production [Marx (1959), p 325].

relations. They argued that a man should dispose of his labour time as he pleased, either by applying it to the production of agricultural goods for exchange, or by entering into labour-service or wage-labour with white colonists. The net effect of such intervention was the emergence of independent commodity producers.

Mining Capital and the Growth of Labour Migration

Diamonds were discovered in 1867 in the Kimberley district of South Africa and there was a new demand by the colonists and traders for the grain and labour of the Basotho. The years 1868-1880 were ones of prosperity for the Basotho and there were significant increases in the production of agricultural commodities such as wheat, maize, wool, and mohair. In 1873, 100,000 bags of grain - wheat, maize and sorghum - and 2000 bags of wool were exported. In the same year, goods of British or foreign manufacture worth about £150,000 were imported into the country [Murray (1980), p 5]. But these years were also ones of rapid and traumatic changes for the Basotho. Their formal independence had been brought to an end. Following the Aliwal North Convention, large tracts of Basutoland's most fertile land had been lost to the Orange River Sovereignty and the geographical boundaries of the country had been sealed. Basutoland became integrated more closely into the political economy of South Africa. In the period up to the First World War, the country continued to export grain to South Africa. During the 1880s and 1890s the entire lowlands came under the plough [Spray (1975), p 4]. In 1896, the country was still referred to as "the granary of South Africa" by the Catholic missionary Ferdinand Porte [Spray (1975), p 5]. By the early 1900s, wool and mohair had become more important than grain in

export earnings. But the overall impression of the accounts of this time was that the 1870s had been a golden age and that the relative prosperity of these times would not be repeated.

By the end of the 1870s, evidence of the relative impoverishment of Basutoland was becoming clearly visible. The imposition of the hut tax, the influx of traders, and the decline of other branches of production, were forcing Basotho into ever greater dependence on commodity production for exchange. A missionary noted in 1887:

> "The population is rapidly increasing, the fields are becoming exhausted, the pastures diminishing, stock farming yields more disappointments than profits...."[Germond (1967), p 469].

In 1881 Basotho smiths were still at work, but bought iron from white merchants instead of extracting it from local ore; by 1908 iron-working was under white control. Other craftsmen were overshadowed by the white's economy as trade was mostly in white hands. A railway line was built from the Cape to Kimberley and American wheat began to be imported at the expense of Basotho grain, which had tariffs imposed on it, first by the Orange Free State and later also by the Transvaal.

The discovery of diamonds and the imposition of colonial rule marked an important decade of transition for the Basotho. The fifteen years between the discovery of diamonds and the discovery of gold witnessed both an intensification of previous trends, and the emergence of new developments. The forces promoting the production of commodities - both internal and external - intensified. The striking difference was that, with the establishment of capitalist production at the mines, on the colonial rail-works and in some farming districts, there was a greater demand for the sale of labour-power as a commodity.

The development of diamond, and subsequently gold, mining was, in many ways, a major watershed in the economic history of the sub-continent. The African people were drawn more firmly into the capitalist economy of South Africa. A transition from one form of participation in commodity markets, the production of agricultural commodities, to another, labour migration, was made necessary by the changing nature and requirements of capital. It was estimated that by 1875, out of a total population of 127,000 , nearly 15,000 men were obtaining passes to work outside of the territory, and, by 1884, this number had doubled [Ashton (1952), p 162].

Enforced labour migrancy did not happen prior to the establishment of the gold mining industry in South Africa. There is, however, evidence of some labour migration before the opening of the mines, which might be categorised as voluntary migration. Casalis, in 1861, writes of Basotho going to the Cape Colony for work. The Basotho also began to work for white farmers as the latter established themselves and began to raise crops as well as livestock. It has been noted that farming in the Orange Free State would probably not have developed in the way it has if Basotho labour had not been available [Wilson (1972), p 14]. However, prior to gold mining, there was no dominant mode of production in the sub-continent. There was no influx of imperial capital, on any scale, and no substantial development of capitalist agriculture. Wider political divisions between and within settler groups inhibited the creation of an economic infrastructure to serve the emergent capitalist mode of production. Above all, at this stage, Basotho producers could still satisfy their immediate cash needs through agricultural production for exchange. Competition among employers of labour thus led to wage increases, the

free sales of arms, and a perennial state of "labour shortages".

Labour migration at this time was a function of the prevailing social division of labour within the Sesotho social structure - hence the previous emphasis on the role of the chieftainship and Koena lineage in organising such movements. Traditionally the system of tribute labour had worked reasonably well and, in exercising his power, the chief was responsible to the people he ruled. Major decisions were usually made only after a chief's followers had been consulted in a pitso, a public gathering where all men had the right to voice an opinion. Thus a chief was a "chief by the people" and if he proved unworthy of his office, his critics could abandon his rule for another [Jingoes (1975)]. But as land shortages became an acute problem and as the chief's position was made more secure by the colonial administration, he had less to fear from dissatisfied followers.

A hut tax was introduced, with the chiefs holding the power of tax collection. The percentage they received for performing this duty, together with the fines imposed by the chief, in his judicial capacity, were important additions to their often not inconsiderable incomes. For example, Molapo, second son of Moshoeshoe and senior chief in the Leribe District, received approximately £800 a year out of the hut-tax collected from his people [Murray (1980), p 6].

Chiefs demanded that only those who had paid their taxes should be given land. The system of tribute labour was also extended beyond the traditionally accepted bounds. The significance of the chiefs' unchecked control over land was greatly enhanced by the loss of arable land to the Boers, such that institutions which were originally acceptable to the people, became increasingly oppressive.

These factors contributed to the early growth of labour migration. The chiefs found that the migrant labour system could be an important means of increasing their own incomes. They received a percentage of recruitment fees and also benefited from the direct taxation of recruits in the form of traditional tributes. Often those who could not afford taxes or fines were forced into recruitment [Kowet (1978), p 98]. But at this early stage, migration was hardly a significant feature of the Basotho economy and it is likely that the labourers left for short periods only.

It was the emergence of the gold mining industry which "created the conditions for the dominance of the capitalist mode" [Legassick (1974)]. By 1899, a mere 13 years after the discovery of gold, the gold mines employed some 100,000 African workers [Wilson (1972), p 3]. Various measures such as land appropriation, selective development of the infrastructure, and subsidisation of capitalist farming, ensured that African agricultural commodity producers were no longer able to satisfy their growing cash needs (including taxation) through the exchange of their agricultural produce, and were thus compelled to sell their labour-power on the capitalist market [Bundy (1972)]. Minimisation of costs incurred in gold mining was achieved by enabling capital to obtain labour-power at a price less than the cost of its reproduction, a cost which was instead borne by the restructured and conserved non-capitalist mode of production in the rural areas. Labour migrancy can thus be seen to be a direct function of the interaction between capitalist and non-capitalist modes of production in southern Africa.

The number of labourers leaving Basutoland continued to increase, as is indicated in Table 3.12 (29).

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(29) The actual number of Basotho involved in labour migration was

Year of Census	Number of Migrants
1911	24 600
1921	47 100
1936	101 300
1946	128 000
1956	154 800
1966	117 300

TABLE 3.12 : Basotho Migrant Labourers Working in South Africa. Source: van der Wiel (1977), p 14.

Labour migration should be seen against the general background of events in southern Africa at the turn of the century which:

> "....contributed to the diminution of the surplus-generating capacity of the peasant, and to a lessened control of the peasant over his surplus; and at the same time that the possibilities for accumulation were thus restricted, the capitalist penetration raised the demand for a cash income. The peasant's increasing involvement in migrant labour depleted the intensity of economic activity in the peasant areas, thereby reproducing the necessity for more migrant labour" [Bundy (1972), p 388].

Africans from all over the region had responded to the opportunities of farming for new markets in much the same way as the Basotho had done. Members of the Cape Assembly, in a debate in 1880, thought the Basotho's rise to prosperity remarkable, but matched by that of the Fingoes and Tembu of the Eastern Cape [Spray (1975), p 19]. There were complaints from the mines, as well as from the white farmers,

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much higher than is indicated in this table, as a sizable proportion of the migrant workers were on leave at home at the time of the population censuses. The drop in the number of migrant workers in 1966 is chiefly due to the fact that, in 1963, South Africa had instituted border control posts and the movement of migrant labourers was controlled more strictly. A significant number of Basotho who migrated before 1963 settled permanently in South Africa. These people had been included in the population censuses prior to 1966. The 1966 census also adopted a more stringent definition of those who should be considered migrant labourers.

about the shortage of labour. The alternative was to destroy African farming and thus, in 1913, the Land Act was passed, limiting the land available to Africans to a mere 13 per cent of the area of South Africa. One of the effects of the Land Act was to increase the migration into Basutoland by black farmers, thus further exacerbating pressure on the land. An early African writer noted that:

> "....the influx of outsiders into Basutoland could not continue at the rate it was then proceeding without seriously complicating the land question in Basutoland, where the chieftains are constantly quarrelling over small patches of arable land" [Plaatje (1916), p 105].

Labour migration soon became more important than the export of agricultural commodities, and by 1903 Basutoland had to import food for the first time [van der Wiel (1977), p 63]. The colonial administration was prepared to encourage this process. In 1899 the Resident Commissioner wrote:

> "Though for its size and population Basutoland produces a comparatively enormous amount of grain, it has an industry of great economic value to South Africa, viz. the output of native labour. It supplies the sinews of agriculture in the Orange Free State, to a large extent it keeps going railway works, coal mining, the diamond mines at Jagersfontein and Kimberley, the gold mines of the Transvaal and furnishes, in addition, a large amount of domestic services in the surrounding territories. These facts are the best rejoinder to those who argue that Basutoland is a useless native reserve. To others who urge higher education of the natives, it may be pointed out that to educate them above labour would be a great mistake. Primarily the native labour industry supplies a dominant want, and secondarily it tends to fertilise native territories with the cash which is at once diffused for English goods" (30).

A series of environmental setbacks served to hasten this process. There were some catastrophic droughts, and in the 1890s a rindepest epidemic decimated the cattle population [Germond (1967), p 476]. This rendered ploughing very difficult and severely hampered the

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(30) Colonial Annual Reports (1898/1899), quoted in Lesotho Third Five Year Plan, p ii.

transport of grain. Despite these difficulties, Basutoland retained its role as a substantial exporter of grain until the 1920s. From that period onwards the territory began to import large amounts of food, especially maize.

In summary then, the production and exchange of agricultural commodities and the sale of labour-power by the Basotho represents essentially two different forms of one fundamental process: the development of the production of commodities. At the core of the process of colonial conquest lay the transformation of Basotho production, the orientation of production more and more to exchange values by making the satisfaction of needs and subsistence more dependent on the sale, rather than on the immediate use of the product. The enforced transition from one form of participation in the commodity markets to another was, for the African populations in the sub-continent, ultimately determined by the changing nature and requirements of capital. In the long run, the whole process "created the conditions for the structural dependence of the non-capitalist social formations on the capitalist social formation of South Africa - the form of underdevelopment specific to the era of gold mining in the sub-continent" (31).

This analysis effectively refutes some of the tribal-cultural reasons which have been advanced for the high prevalence of labour migration from Lesotho. One of these is that labour migration acts as a kind of rite de passage or initiation into adult life [Schapera (1937), p 117]. None of the respondents in extensive surveys conducted in the Phuthiatsana and Thaba Tseka project areas claimed to have left

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(31) This is the main thesis of Kimble (1978).

for this reason (32). Nor do any motives associated with modernising influences appear to have any significant effect on labour migration. Once again surveys indicated that mining ranked as the least desirable profession. On the other hand there is no doubt that there are certain prestige factors associated with migrant labour such as access to ready cash and desirable consumer goods. It is also interesting to note that population density and accessibility do not have any significant impact on the magnitude of the migratory labour flow. Population density is substantially lower in the mountain area than in the lowlands, and lowland people have easier access to the employment centres of South Africa and to the recruiting stations, almost all of which are located in this area. Yet the proportion of migrants from the mountain area is only marginally less than that for the lowlands [van der Wiel (1977), p 19]. These facts tend to support the above thesis that the Basotho are forced to enter into labour migration as a consequence of an historical process which has weakened their indigenous economy and which has ensured that Lesotho remains primarily a labour reserve, serving the interests of the white controlled, capitalist (and predominantly mining) economy of South Africa.

We have seen that the growth of production of agricultural commodities, its subsequent decline, and the growth of labour migration, were not only determined by these external factors, but were also influenced by the internal Basotho social structure. The social division of labour and the forms of surplus extraction and exploitation were reinforced by political developments during, and subsequent

(32) Thaba Tseka Mountain Development Project (1977a); Phuthiatsana Irrigation Project (1976).

to, colonial rule.

Political development

In the ensuing years of colonial administration, positions of power and control were secured by a social class which failed to challenge or alter the steady increase in labour migration and Lesotho's growing dependence on the economy of South Africa.

Modern political development can be said to have begun with the founding of a National Pitso , or popular assembly, in 1874. This adaptation of the traditional clan meeting provided a forum for the men to participate in decision making. However, the large numbers involved and the distances to the capital caused the Pitso to be more an opportunity for the Paramount Chief to announce decisions than for him to receive advice on proposals. In 1903, a National Council was established as an advisory body to the Paramount Chief, and, in 1910, it was superseded by the Basutoland Council. It comprised 100 members, 94 of whom were appointed by the Paramount Chief, and hence was dominated by the "sons of Moshoeshoe", members of the ruling lineage which had been "placed" in the various positions of the chieftainship.

The stated aims of the colonial administration were to maintain law and order and to see that British interests were favoured at the lowest possible cost. An interest was maintained in the chiefs largely because of their political control over the people. In 1938, after a visit by Sir Alan Pim, the British decided to reduce the number of gazetted chiefs. Within eight years the number was reduced from 1330 to 122. This was accomplished with little protest other

than from the chiefs themselves. Later they were reduced even further, to 63, giving the British even firmer control. The territory was administered by a Resident Commissioner in Maseru aided, after 1946, by 9 District Commissioners. More elected members were incorporated in the Basutoland Council and District Councils were also established.

The first political opposition to the chiefs emerged among the civil servant and trading classes. They organised, in 1903, the Progressive Association to oppose the power of appointed chiefs and to seek election of representatives to the Basutoland Council. In 1950, they gained the right to nominate one member to the council. A more radical organisation, Lekhotla la Bafo, came into being in the 1920s and established links with the South African Communist Party. Although suppressed for sedition during the war, it too was later granted representation on the National Council.

Demands for greater say in government increased. Village Committees were set up as constituencies for elections to the District Councils. They began to function as checks on the chief's authority to distribute land, and also began to encourage the establishment of farming co-operatives. The District Councils began to gain widespread public support. They administered the migrants' deferred pay and on occasion provided credit and loans for agricultural development.

As Basutoland appeared to be moving towards self-government, the first modern political parties came into being. The Basutoland African Congress (later called the Basutoland Congress Party), led by Ntsu Mokhehle, began to oppose British rule in 1952. The British proposed modest reforms in 1954, but the Congress demanded constitu-

tional talks. The British responded by suspending the leaders of the Congress, but this only caused the movement to become more strident and popular.

Mokhehle's Congress party was attacked by the Roman Catholic Church for its "communist connections". The Church was influential throughout the country and, together with the white traders, was instrumental in the formation of the Basutoland National Party (BNP), in 1959, under Chief Lebua Jonathan. Much of Jonathan's support came from the minor chiefs who had been de-gazetted by the British. The BNP took a firm anti-communist line and advocated close links with South Africa.

A succession dispute between the Regent and the Paramount Chief designate was instrumental in the emergence of the Marema Tlou Party (MTP), whose leader, Chief Samuel Matete, formerly a member of the Congress Party, supported the Paramount Chief and drew much of his support from the leading chiefs.

The Basutoland Congress Party (BCP) commanded support in the village committees, District Councils and among the migrant workers. In the 1960 elections to the National Council, it won the great majority of the seats, with the BNP gaining only one. The BCP however was dogged by internal dissent. Mokhehle himself fell out with ANC refugees from South Africa and suspected their spokesman, Joe Matthews, and others of aiding the formation of the Lesotho Communist Party. The BCP deputy leader, Khaketla, who had provided the party with a mouthpiece in his newspaper Mohlabani, left to form the Basutoland Freedom Party in 1961. After failing to join the BNP, it merged with the MTP to form the Marema Tlou Freedom Party (MFP). Mokhehle's BCP suffered

further setbacks when in 1964 ten of his parliamentary supporters in the National Council left the party. By the time the London Constitutional Conference had been called to negotiate independence, he could count on only 17 of the original 29 party members who had been elected to the Council in 1960.

Under the new Independence Constitution, the Paramount Chief was to become head of state under the title of "King of Lesotho". He was empowered to make 11 appointments to the Senate, which was to include the 22 Principal Chiefs as ex officio members. The National Assembly was to consist of 60 members elected by universal adult suffrage. The Executive would consist of a Cabinet with a Prime Minister and not less than 7 ministers, all responsible to the lower house.

Prior to the 1965 elections the BCP took an increasingly anti-chieftainship stance. It gained support from the trade unions, but the BNP had the backing of the powerful Catholic Church as well as the media, including the South African propaganda service for Africans, "Radio Bantu". The BNP, with 41 per cent of the vote, ultimately won 31 seats, while the BCP gained only 25. The MFP, which focussed much of its election campaign on the future role of the Paramount Chief within the new constitution, won the remaining 4 seats. Lebua Jonathan himself lost his seat but was subsequently returned to parliament after a safe by-election.

The Republic of South Africa had openly backed the BNP with the provision of vehicles and election expenses. The BNP leader was allowed to address gatherings of migrant workers in the Republic, whilst most of the opponents of the party were banned from doing so. Immediately prior to Jonathan's re-election, 100,000 bags of maize were sent to

him as a "gift", most of which were distributed in his constituency [Khaketla (1971), p 32]. Mokhehle's BCP and the MFP strongly opposed Britain's decision to grant independence to the new government on the grounds that power was being handed over to a minority regime "under the guidance of Dr Verwoerd" (the Prime Minister of South Africa at the time) [Spence (1968), p49]. Independence, however, was granted finally in 1966.

Jonathan continued to maintain close ties with Pretoria. An influential team of South African advisors and administrative personnel was appointed, including the Chief Justice, the Attorney General, the Director of Public Prosecutions, the Chief Electoral Officer, an economic advisor, a district magistrate, the Director of Radio Lesotho, a constitutional advisor, and some sixty other advisors. Dr Anton Rupert, one of the most influential Afrikaner industrialists in South Africa, served as an industrial advisor. Perhaps the most prominent among the advisors was Senator Horwood, now Minister of Finance in South Africa [Khakhetla (1971), p 120; Weisfelder (1972), p 133].

Jonathan began to centralise and consolidate power. The second and third tiers of government were dissolved, thus destroying many years of hard work and mobilisation of the people. Three months after independence, after a constitutional dispute involving the king, the latter was confined to his palace and later had to sign a pledge to adhere to his role as constitutional monarch. Mokhehle was also briefly detained.

The BNP government began to control employment practices. In the new projects created by the LNDC, the BNP insisted that only card-carrying party members were to be employed. The mine labour recruit-

ing organisations followed suit [Khaketla (1971), p 184].

However, the aid and investment from South Africa, which had been hoped for by the BNP, failed to materialise. Between 1967 and 1970, aid from South Africa amounted to only 50,000 bags of maize and sorghum, 1000 bags of fertiliser, the provision of police experts, and an agriculture demonstration [Leistner (1970), pp 11-18].

Two important bills were passed by the BNP government. The Pioneer Industry Act was intended to attract foreign investment and was a consequence of pressure by South Africa against the land tenure system in Lesotho. The Pioneer Industry Board was given power to to grant leases of land for a period of 99 years. This power was later transferred to the LNDC. However, in spite of these measures and the generous incentive schemes offered by LNDC, the actual level of foreign investment was disappointing.

The second bill, the Chieftainship Act, was a political measure to control the powers of the chiefs. The Minister of Chieftainship Affairs was empowered to withhold salaries of chiefs if, in his opinion, they were not properly carrying out their duties. Under the act, a chief could be banished from his area, his movements within the country were required to be sanctioned beforehand by the minister, and his associates were only to be those who were deemed "desirable" by the Minister.

As the 1970 elections approached, the opposition parties concentrated on the lack of economic development in the country since independence and criticised the BNP's links with South Africa. Despite the efforts of the South African Electoral Officer to halt the opposition in some constituencies by changes in the delimitation of constituent

areas, there was a 60 per cent swing of support against the BNP in a high electoral turnout [Kowet (1978), p 209; Macartney (1974), p 492]. The results were never made public. Jonathan suspended the constitution and declared a state of emergency. Opposition members were arrested, newspapers banned, a curfew imposed, and the king forced into exile. South African military personnel took responsibility for supervising the state of emergency and South African troops were stationed on the borders.

Britain suspended aid for a short period, but later resumed grants, as did the USA, after claims that Lesotho was facing a catastrophic drought. Most of the detainees were released by mid-1972 and the king returned from exile. In 1973, Parliament resumed with nominated members, including some who had lost their seats in the 1970 elections. An attempt was made to form a government of national unity, but without success. In 1974, following an attempted insurrection which was put down with violence (about a hundred people were killed), the much-weakened BCP, which had been deprived of its victory in 1970, took the road to exile. Some of the BCP leaders later returned to the country to benefit from an amnesty and government posts offered by the prime minister, who had become sensitive to his image abroad. The BCP split into several factions, but its original leader, Ntsu Mokhehle, has continued to fight for free and honest elections supervised by the United Nations.

Subsequent years saw an apparent shift in relations with South Africa. Government members became increasingly outspoken in their criticism of the apartheid regime. There has been the refusal to allow a South African consulate to be opened in Maseru, a refusal to recognise the "independence" of the Bantustans, and a territorial

claim for the return of the "historic part of the kingdom" from the Orange Free State. One effect of this shift has been a marked increase in the flow of international aid to Lesotho. As Lesotho's international perspective widened, and its contacts with other African countries grew, it became apparent that recognition of the BNP government by the Organisation of African Unity would follow as long as Lesotho distanced itself from South Africa. In 1975, the OAU Secretary General visited Lesotho for the first time; he was followed two years later by the Assistant Secretary General of the United Nations. There was a call for aid to reduce Lesotho's dependence on the Republic of South Africa and the UNDP singled out Lesotho as one of six countries requiring special attention from the international aid community.

Lesotho discovered that she had underestimated her room for manoeuvre. She gained a limited leverage with South Africa as the latter still regarded Lesotho as important in aiding its own attempt to break out of isolation and establish contacts with other African states. Lesotho also learned that relationships with multi-national corporations within South Africa are perhaps of more significance. They employ most of Lesotho's migrants in the gold mines and contacts with the Anglo-American group, for instance, have grown with De Beers (one of its associated companies) investing in Lesotho. This trend has been reinforced as the regional balance of power has tilted markedly against the white regime with the independence of Angola, Mozambique, and Zimbabwe.

It can be argued that the substance of Lesotho's changed relationship with South Africa has been confined to the verbal rather than the concrete. Lesotho government leaders warn of chaos and violence in

the sub-continent and voice support for South African liberation movements. South African personnel in Lesotho have largely been replaced by U.N. advisors and donor agency expatriates. But Lesotho appreciates that interstate relations can be carried out at many varied, and often contradictory, levels. A Basotho labour representative is still maintained in South Africa and Lesotho is still a member of the South African Customs Union. On a private level, the government encourages interest in Lesotho among South Africans, including potential investors, tourists, and suppliers.

Perhaps the most striking example of how relations between Lesotho and South Africa, however publicly hostile, conceal a private acceptance of the relations of economic dependence, is the recent revival of the Oxbow-Malibamatso hydro-electric scheme. The Highlands Water Scheme (as it has been renamed) could become one of the largest and most ambitious regional development projects in Africa. It is planned to divert water for sale to South Africa from the upper Malibamatso and Senqu rivers, which rise in Lesotho, and at the same time to generate hydro-electric power to meet the latter's own energy needs. Water is the one remaining natural resource of real revenue earning potential in Lesotho. There has been an agreement to share equally the £6 million cost of a two year feasibility study of the project, starting in June 1982. The EEC has indicated a willingness to pay for Lesotho's share under the terms of the Lome Convention. In addition, technical assistance worth some £650,000 will be provided by the United Nations, through the World Bank, in the form of a team of engineers and financial analysts, to help Lesotho to carry out the study. As now envisaged, the scheme will entail the building of five storage dams, a 100 km diversion tunnel through the moun-

tains, three power stations, and a pumping station in northern Lesotho. Construction will be completed in four stages, ending in 1992, 1996, 2000 and 2004 respectively. About 35 cubic metres of water a second will be diverted northwards, from the south-flowing Malibamatso and Orange rivers, to the Pretoria - Witwatersrand - Vereeninging area of South Africa, mainly for industrial use. South Africa will pay a royalty for each cubic metre exported on a cost-plus basis. In spite of the impressiveness of the scale and earning potential of this scheme, there has hitherto been no discussion or appreciation of the likely crippling effect the huge capital and loan burden is likely to have on Lesotho's miniscule economy. Experience of other large water/hydro-electric schemes has not been encouraging (33).

At the same time South Africa has continued to destabilise Lesotho by providing facilities for the armed faction of the BCP, the Lesotho Liberation Army (LLA), to wage an urban and rural guerrilla campaign, which has hitherto taken relatively few lives, but has proved increasingly irksome to the BNP government. Recent incidents have included the shelling of the main base of Lesotho's paramilitary force, the PMU, from across the border, and the assassination of a government minister.

All these events have contributed to Lesotho's enormous dependence on South Africa. This situation is maintained not only by the interests of mining capital, which have ensured that Lesotho remains predominantly a labour reserve, but also by a minority government within Lesotho which has left the country deeply divided, and which has been

(33) See for instance David Hart's study on the Volta River Project in Ghana [Hart (1977)].

more concerned with holding on to power than mobilising its people for development.

Of the four national aims stated in the first and second five year plans - economic growth, social justice, maximum domestic employment, and economic independence - Lesotho has had only modest success in terms of economic growth, and that has been due largely to factors beyond its control - namely the increase in migrant remittances. Lesotho has been conspicuously unsuccessful in the other three objectives. Just as the 1870s marked a watershed in Lesotho's development, so do the 1970s. In the former period, Lesotho experienced relative affluence and prosperity as it responded to the demand for its commodities. However, the advent of mining led to the steady growth of labour migration, and the decline of agricultural production. Now, one hundred years later, it is changes in the mining sector in South Africa which again necessitate radical changes in Lesotho's domestic economy. For although Lesotho has experienced, in the past decade, a rapid growth of incomes, the country's economic prospects are bleak. In the next decade, growth in the potential labour force will be reflected in unemployment, rather than in migration, and will create an unprecedented problem of poverty. It remains to be seen whether the possible opportunities which foreign aid offers can be purposefully used to counter or at least ameliorate these trends. It is within this context that the third major factor structuring Lesotho's economy, international aid, is examined.

FOREIGN AID

Foreign aid has become immensely important as a vehicle for technological change and development in Lesotho. Aid, though, is something

of a double edged sword. If used purposefully it could provide an opportunity of ameliorating the effects of reduced migrant labour. If not, it could merely add substantial recurrent costs to the budget, result in inappropriate project and technology choices being made, and, in the end, simply mean increased markets for South African contractors and manufacturers of consumer goods.

One of the first acts of the BNP government, in 1965, was to approve an IDA loan of $4.1 million for the Lebua Jonathan highway [Wiesfelder (1972), p 131]. The BNP's attempt to use large scale prestigious development projects to woo voters is illustrated in a pre-election speech made in 1969 by Jonathan.

> "If you think that the roads we have constructed are a good thing, return us to power. If you think the electricity we have brought to Lesotho is a good thing, return us to power. If you think the industries we have brought to Lesotho are a good thing, return us to power.....If you reject the BNP, then you reject the developments we have achieved" [Khakhetla (1971), p 189].

This speech reveals three key features of development and foreign assistance in the initial years following independence.

[1] Development projects were of direct benefit to only a small proportion of Lesotho's population. For example, the road, North-East of the capital and by-passing Jonathan's village, was the only bitumenised road in the country. Electricity supplies were available only in some of the urban centres in the western belt of the country, close to the border with South Africa (4 per cent of the population reside in urban areas). Furthermore, only a handful of local industries were established, and these produced mostly relatively expensive consumer goods, many of them for export. Overall, these development projects probably benefited less than 5 per cent of the population.

[2] Jonathan's speech itself suggests that development projects were designed by the BNP government to stay in power rather than in accordance with any development goals.

[3] All three major projects cited by Jonathan illustrate the importance of South African involvement at that time. South African contractors were involved in the construction of the highway, electricity was supplied from South Africa's ESCOM grid, and the majority of industries established were dependent on South African capital.

In the years following the coup in 1970, Lesotho paradoxically began to seek and receive aid from abroad. As has already been argued, this shift, from co-operation with South Africa to a greater reliance on international aid, followed the recognition that actual economic aid had been minimal and that Lesotho had much to gain if it at least appeared to distance itself from South Africa. In a speech to a meeting of donor agencies, Lebua Jonathan demonstrated the extent to which Lesotho began to take advantage of its position of dependence on South Africa.

> "It is not my intention here to go at length into what is now happening in South Africa; I merely wanted to emphasise in passing that the more the racist regime in South Africa is pushed into the corner by national and international forces of change, the more vengeful they are going to become towards not only their unfortunate Black victims in South Africa, but also towards all symbols of the free world's principles of a just society, and my country is the nearest target. This is the emergency situation under which we are living, and because of which we will constantly be knocking at the doors of all countries of good will" (34).

Thus despite, and perhaps because of, Lesotho's overwhelming economic

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(34) Concluding remarks by Prime Minister Lebua Jonathan at the Lesotho Donor Conference, Maseru, 1975.

dependence on South Africa, she has become the recipient of relatively large amounts of international aid, to such an extent that aid has become, in recent years, a crucial and substantial element in Lesotho's national development plans and programmes.

Historically, Britain has provided most of Lesotho's foreign capital. In the colonial years, Britain had striven to reduce its contribution to Lesotho's recurrent budget and, in the years following independence, Britain's grants-in-aid declined from M5.2 million in 1966 to M0.9 million in 1971. This decline reflected, in part, the reduction of Lesotho's recurrent budgetary deficits from M6.1 million to M1.3 million over the same period (35). However, Lesotho's capital expenditure increased marginally, as did British capital grants which increased from M2.4 million in 1966 to M3.2 million in 1971 [World Bank (1975a), p 26]. As recently as 1972, Britain still contributed as much as 80 per cent of Lesotho's capital budget. The extent to which Lesotho's dependence on foreign aid has both increased and diversified is illustrated by the fact that, by 1975, British capital aid formed only 30 per cent of the total, the deficit being made up by other donors.

Lesotho's own contribution to the development budget has been comparatively small. In 1973, only M1 million was forthcoming from local sources, although subsequently the percentage of local capital has increased substantially, largely as a result of Lesotho's increased share from the customs union revenue pool. During the Second Plan period, foreign aid contributed 59 per cent of funding

(35) Lesotho's recurrent budget is currently wholly financed from domestic resources, whereas the capital budget remains heavily dependent on external aid flows.

towards development, whilst government revenues provided 31 per cent and commercial loans 10 per cent [TFYDP, p 61]. But, the importance of this development should not be over-estimated, particularly as Lesotho's contribution to the development budget has largely been accounted for by projects such as the new Hilton Hotel (M1.3 million) and the new Royal Palace (M0.3 million) for which donors were more reluctant to provide funds.

The steady increase in development assistance to Lesotho is shown in Table 3.13.

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
10	17	14	14	21	30	30	39	50	64

TABLE 3.13 : Disbursements of Official Development Assistance to Lesotho ($ million)
source: World Bank (1981b), Table 22.

The United Nations Development Programme (UNDP) estimates that the value of development assistance to Lesotho in 1977 included $18.5 million of technical assistance, $21.6 million of capital loans and grants, and $8.5 million of food aid (36). Domestic resources utilised for development purposes within this year amounted to $11.2

(36) United Nations Development Programme (1978a), p 3.
This data conflicts with that of the World Bank. Note however that the World Bank's figures include only Official Development Assistence (ODA), which consists of loans and grants made on concessional financial terms by official agencies of the members of the Development Assistance Committee (DAC) of the OECD and members of OPEC, with the objective of promoting economic development and welfare. Reliable and accurate data on aid disbursements are almost impossible to obtain. No less than 76 agencies are listed as probable donors to Lesotho in the Second Development Plan. Each of these agencies operates with different financial years, and allocates aid for periods of varying length. Furthermore, aid allocations are seldom fully utilised, and so there are bound to be discrepancies in precise estimates of aid absorbed by Lesotho.

million, of which $6.1 million was made up of Lesotho Government capital account expenditures and $5.1 million was obtained in the form of loans from the local commercial banks. Thus altogether, Lesotho's externally and internally financed national development programme, excluding private investment, amounted to $59.8 million in 1977. During the same year, the technical assistance programme provided (on a long or short term basis) for 339 experts, 233 volunteers, and 514 fellowships.

The trend towards a further increase in technical and capital assistance to Lesotho continued during 1978. The value of development funding amounted to $23 million of technical assistance, $24 million in capital loans and grants, and $11.5 million in food aid. By 1979, technical assistance had increased to $49 million, part of which represents commitments by bilateral donors for 1980 and later years. Capital assistance in loans and grants, for 1979 and beyond, totalled about $134 million and food aid amounted to about $15 million [UNDP (1979a),(1980a)].

Over the two years 1978 and 1979, 59 per cent of the net official development assistance to Lesotho comprised direct grants [World Bank (1981b), p 165]. Other aid indicators are shown in Table 3.13.

Although the proportions of aid which Lesotho receives are generally higher than the average for low income sub-Saharan African countries, they are not unusual. For example Botswana, Gambia, Guinea-Bissau, Mauritania, Senegal, and Swaziland all receive higher per capita aid disbursements. And in terms of aid as a percentage of GNP, Botswana, Burundi, the Central African Republic, Chad, Gambia, Guinea-Bissau, Mali, Mauritania, Rwanda, Swaziland and Upper Volta all receive

	Net official development assistance (disbursements)			
	U.S. dollars per capita	Bilateral as % of total	As % of GNP	As % of gross domestic investment
Average for low income countries	18.4	60	6.6	47
Lesotho	48.8	68.8	14.4	91.2

TABLE 3.13 : Indicators of Aid to Sub-Saharan African Countries, 1979.
Source: World Bank (1981b), p 164.
note: net disbursements equal gross disbursements less payments to donors for amortisation.

higher proportions. Again, in terms of aid as a percentage of gross domestic investment, Burundi, Chad, Gambia, Mali, Somalia, and Upper Volta surpass Lesotho [World Bank (1981b), p 164]. The position of Lesotho as a recipient of aid is thus not atypical of many sub-Saharan African countries.

Technical assistance is provided in the form of the supply of skilled personnel, consultants, training courses and scholarships. Over the second plan period, some 1200 expatriate personnel were seconded to Lesotho, and the number of technical assistance projects amounted to about 290 in 1979 alone. The majority were in the agricultural and rural development sectors and in education , followed by the transport, communication and industry sectors. The major donor was Britain, followed by the Federal Republic of Germany, the United States, Ireland, the Netherlands, Sweden, Canada, the UNDP, and other U.N. agencies. Increased levels of technical assistance and numbers of expatriate personnel are expected over the Third Plan period [UNDP (1980a)].

Food aid is mostly provided by the Catholic Relief Services and the World Food Programme, with smaller amounts by Save the Children Fund and the Unitarian Service Committee of Canada. The food goes to primary school feeding and clinic nutrition programmes, strategic reserves, and poorly organised labour intensive public work schemes such as the construction and maintenance of fish ponds, conservation works, and rural access roads. Food aid imports have increased from 13.9 tonnes in 1975 to 37.8 tonnes in 1979 (37).

In the case of capital assistance, the major sources for commitments for 1979 and beyond were the United Kingdom, the Federal Republic of Germany, Canada, the African Development Bank, the Arab Bank for Economic Development in Africa, the United States, the Kuwait Fund for Arab Economic Development, and the Netherlands (38). Capital assistance projects may be divided into two main categories: firstly, prestigious projects, like the new International Airport and the Earth Satellite Communications System, as well as other transport and communications projects, like the national roads project; and, secondly, agricultural and rural development projects. United Kingdom aid has mainly been directed towards the last two sectors.

In 1980/81, M186 million of aid had been promised by donor agencies for ensuing years. This amount was more than double the total government recurrent expenditure and nearly four times the public capital expenditure for 1979/80. Although for Lesotho this aid represents a huge reserve of investment resources, there are limits to the country's capability of absorbing further external inputs.

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(37) World Bank (1981b), p 166. Units are metric tons, grain equivalent.
(38) For a detailed list of aid projects, see Appendix II.

The rapidly accelerating development programme is placing an increasing strain on domestic financial resources as recurrent expenditures such as wages and maintenance costs on capital projects have to be absorbed. Total government expenditure rose by almost two-and-a-half times between 1975 and 1979 [TFYDP, p 23]. The increase in recurrent expenditure has been offset in recent years by increased income from customs union receipts, mainly due to increased migrant wages. However, as this source of revenue declines, a potential and serious public expenditure crisis is likely to arise.

Despite more than ten years of international aid, the structure of Lesotho's economy remains largely unaltered. It has already been noted that Lesotho's dependence on migrant labour remains as strong as ever and that its economy is extremely vulnerable to changes in this sector. Agricultural production has stagnated and probably declined, dependence on imports has increased, and industrial development has been extremely limited. The Lesotho government has been able to capitalise on anti-South African sentiment, and, arguably, international aid has served merely to maintain the BNP party in power.

The aid process does, however, serve to influence and structure the design and nature of development programmes and technological change. The interplay of interests between donors and the ruling elite in Lesotho determines what kinds of development programmes are given priority. On the one hand, the political elite in Lesotho have demanded prestigious projects which have mostly involved foreign contractors employing primarily foreign skilled labour and capital intensive techniques, such that much of the money invested in these projects has left the country through foreign firms. Technologies

chosen for projects in which donor agencies are involved are often biased towards a relatively high level of imported capital components through either the restriction of agency financing to foreign exchange capital costs, or through procurement tying.

On the other hand, many of the current development projects have been conceived by donors who then approached the respective ministries and invited them to consider their interest in making a request for support for a project. The effect of this is ambiguous. Firstly some projects will reflect the trends towards imported capital intensiveness as described above. There is, however, a second effect which is primarily ideological. All major donor agencies have, since the late seventies, been influenced by the philosophy of "basic needs" and also "appropriate technology". These concepts have to a greater or lesser extent reoriented their aid policy towards the needs of the rural poor. This shift has been reflected in Lesotho in the concentration of development projects in the agricultural and development sectors, and in attempts to introduce more appropriate technologies which take into account local conditions and needs.

The government of Lesotho has begun to capitalise on this trend. Realising that many donor agency have included among their policy pronouncements the meeting of basic needs and the utilisation of appropriate technologies, the Third Five Year Plan gives some emphasis to re-allocating resources to the rural poor:

> "...a major portion of development expenditure will.....be focussed on the rural sector.....alternative technologies with differing implications for the number of jobs created and the share of wages will be analysed. We start with the social and economic status of large poverty groups and design development programmes with their needs and problems as the basis..." [TFYDP, pp 51,52].

This interplay of interests between aid agencies, the government of

Lesotho, and the recipients of aid projects, will be examined in succeeding chapters.

SUMMARY

This chapter has sought to place an analysis of those factors which govern and constrain the nature and scope of technological change and rural development firmly within the larger context of political economy. This has been achieved by first surveying the current economic and political conditions in Lesotho, and then by tracing the historical developments which have given rise to this situation.

In the early history of the Basotho, productive activities were centred on individual households and were directed towards the satisfaction of basic needs such as food, clothing, tools and weapons. The development of agricultural technologies was governed by the techniques of shifting cultivation and an ecological knowledge, which was based on a perspective of an extensive availability of land. There was thus little need for an intensive agriculture and the technologies which it required. In traditional Sesotho agriculture there was little labour specialisation other than that between men and women. However, an early social division of labour emerged when the chieftainship were freed from directly productive labour. With the establishment of Moshoeshoe's clan, the Bakoena, as a ruling lineage, gained fairly extensive powers of surplus appropriation through such systems as mafisa, matsema, and maboella, as well as military obligations. The emergence of this ruling lineage was an important precondition for the extensive relations of exchange which were to develop between the Basotho and the white settlers and mercantile capital. The demand of the chieftainship for commodities such as cattle, guns,

and horses, which were essential to the continued reproduction of its position of supremacy, facilitated the rise of commodity production on a significant scale.

The establishment of the mission stations provided an ideological reinforcement for the shift to commodity production. With the penetration of mercantile capital and the establishment of trading stores, the missionaries encouraged and helped provide the means for rapid technological change. The plough, wagons, and new varieties of crops were introduced, which enabled the productive base of the Basotho to be transformed to the extent that Lesotho was frequently referred to as the "granary of southern Africa" by contemporary writers. The settlement of boer farmers in the Free State, the development of the railways of the Cape, and the opening of the diamond mines, created not only new markets for Basotho grain, but also heralded the beginning of labour migration on the part of the Basotho. It has been argued that the production and exchange of agricultural commodities and the sale of their labour power by the Basotho represented two different forms of a single process - the development of the production of commodities. At the core of this process was the colonial penetration of the sub-continent and the transformation of African production, such that it was oriented more and more towards exchange values, by making the satisfaction of needs and subsistence more dependent on the sale, rather than on the immediate use, of the product.

The enforced transition from one form of participation in the commodity markets (the production of and sale of grain) to another (the sale of labour power) was ultimately determined by the establishment of mining capital with the development of the gold mines. This

process was facilitated by the colonial power, which not only allowed the productive base of Lesotho to be greatly reduced by the confiscation of Basotho land by the Boers, but also by various administrative measures, such as the hut tax which created a cash demand most easily met through labour migration. In the long run the whole process created the conditions for the structural dependence of the Basotho economy on mining capital in South Africa.

Labour migration increased inexorably right up to the mid-1970s, unchallenged by the political elite which had assumed power within Lesotho. The reduced area of land available to the Basotho required the development of techniques more suited to intensive agriculture, for which traditional techniques and knowledge were often inadequate. Yet, because of the labour policy of the economy of South Africa, with its insistence on short term migratory labour contracts and the paying of less than subsistence wages, the Basotho have always, in some measure, remained dependent on domestic agricultural production.

This dual dependence of the Basotho on migrant labour and subsistence agriculture has had a profound effect on their attitudes towards technological change and innovation in domestic productive activities. Given the overriding importance of labour migration to Lesotho's economy, it is not surprising that agricultural production has stagnated and declined, and that there has been minimal technological change in Basotho agriculture over the past one hundred years. The development of the regional economy in southern Africa, centred on mining capital, has simply not allowed the possibility for the development and adoption of improved technologies which would have enabled an expansion of agricultural commodity production.

The sensitivity and directness of the response of Lesotho's domestic economy to changes in labour migration has been demonstrated, particularly in connection with the performance of Lesotho's economy over the past decade. The sharp rise in migrant earnings had an immediate and deleterious effect on agricultural production. The recent decline in the value of migrant remittances, however, has forced greater attention to be given to agriculture.

These factors structure the environment within which attempts to introduce technological change are made. The above analysis has shown that international aid now contributes the major source of investment in Lesotho, and has become the principal means for attempting to effect these changes. Given Lesotho's almost non-existent industrial base and the severe difficulties for employment creation in this sector, coupled with the recognition that the overwhelming majority of Basotho still depend in part on the land, many aid projects have been directed towards technological change in rural development. More attention has been paid to transforming the agricultural productive base over the past decade, than throughout the entire past century. Given the growing importance of international aid, it is relevant to examine the manner in which the aid process governs the direction, nature and scope of attempts at technological change and rural development.

Before drawing conclusions as to the effect of aid on the nature of technological change, the following three chapters will examine the content of this intervention in rural development, and the different attempts which have been made to transform the productive base through various projects incorporating technological change.

CHAPTER FOUR

THE CONTEXT OF RURAL DEVELOPMENT

The discussion until now has been confined primarily to theoretical and structural analyses of technological change. We have surveyed the literature dealing with technology and development and, in the case of Lesotho, have indicated political and economic structures which have historically governed the nature and direction of technological change. It has been argued that an examination of technological change is best undertaken within such a context. It is fruitful nevertheless, to examine processes of technological change at the more immediate level of people actually adopting a new technology, or modifying an existing one. This is particularly important in rural development, where ordinary people participate in a more immediate sense in the adoption of new technologies and in decisions regarding productive activity, than, for instance, in industrial development, where workers have generally had little control over processes of technological change.

Rural households employ family labour, they own the means of production, and they are involved directly and regularly in investment decisions concerning crop and livestock production. This is not to say that rural people are unrestricted in their choice and adoption of new technologies. These decisions are necessarily constrained by political and, primarily, economic structures which govern the generation, availability and nature of new technologies and their successful dissemination. Nevertheless, an understanding of processes of technological change in rural development is not complete without an appreciation of the physical and social conditions within which

rural people have to survive, and the perspectives which shape their attitudes towards productive activity and technological change. It is thus necessary to examine a number of social and physical factors which might affect the process of technological change. How is agricultural production organised? What technologies are currently being utilised? What are the physical constraints to improved agricultural production? What are the important local institutions and authority structures? What forms of social cooperation and interdependence exist? Does the land tenure system constrain technological change? How dependent are rural areas on urban centres for supplies, technology, and markets? How do these questions affect the perceptions of households towards rural production and technological change?

The first part of this chapter will be used to outline some of the essential features of agrarian society and the rural environment in order to answer these questions. The second part will consist of an examination of the history of colonial intervention in rural development in Lesotho and will complete the analysis of the background against which modern rural development programmes have been undertaken.

It would seem self evident that the characteristics of rural households which are the supposed beneficiaries of rural development programmes, would need to be known before any project was implemented. Yet, in many of the rural development projects undertaken in the Colonial period, and, indeed, in many of the post-independent projects, such knowledge has been absent, or has been thought generally to be of little significance. But, as later sections in the thesis will demonstrate, the nature of agrarian society and perceptions regarding rural productive activity, have a decisive effect on the

ultimate success of programmes aimed at introducing technological change.

RURAL ENVIRONMENT

Nearly 95 per cent of the population of Lesotho live in rural areas; and with an insignificant domestic industrial base, and no commercial deposits of minerals (other than small quantities of diamonds), most Basotho (87%) derive at least part of their income from agriculture [World Bank (1981b), p 178, 179].

Subsistence agriculture forms the basis of Lesotho's domestic economy, and the historical development and subsequent decline of agricultural production in Lesotho has already been described. But agricultural production is constrained not only by institutional and structural factors. At the best of times, agriculture in Lesotho is a precarious occupation. Poor soils and the vicissitudes of a harsh climate, provide difficult obstacles for attempts to improve agricultural productivity.

Physical Environment

For an agricultural nation, land is one of the most fundamental natural resources. Not only the type of agriculture, but also the general levels of productivity and prosperity depend on the natural soil endowment, and upon the management which maintains and improves this endowment or, alternatively, degrades it. Traditional institutions and practices have evolved which closely govern access to and utility of land.

All land is nominally held in trust by the king, although the

government, through the chiefs, effectively controls its allocation. Thus, land cannot be owned or accumulated by individuals. Traditionally, all rural households have been entitled to farm enough land to feed themselves, and have been allocated a maximum of three fields of varying size. Arable land is divided into small, fragmented holdings, which, in the past, have been distributed relatively equitably (1). With the increase in population the average holding per household is now less than 2 ha. [TFYDP, p 157]. The head of the household normally retains the use of his land allocation for his lifetime provided that he does not fail to cultivate it for more than two years in succession. On his death, his widow would be allowed to retain a field and an entitled son might be allocated some of the land.

The basic function of the land tenure system has been to provide as many Basotho households as possible with some share of the subsistence resources offered by arable land. This has been the great strength of the system. Most rural households have had the the security of growing at least some food, and the aggregation of land by individuals or foreigners has been obviated. But with every household being entitled to a plot of land, and with a fast increasing population (2), the land has been minutely parcelled out.

Land use rights are restricted to the cultivation and harvesting of a seasonal crop; after the harvest the land is declared open for communal grazing. All village and mountain pastures are open to such com-

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(1) Less than 10% of farm holdings are greater than 4 hectares, and approximately 25% of holdings are less than 1 hectare [SFYDP, p 71].
(2) The annual population growth rate is 2.3 per cent [World Bank (1981a), p 166].

munal use, but the chiefs have the authority and responsibility to regulate grazing.

Aid donors have brought, over the years, considerable pressure on the government of Lesotho to effect land reform. A recent multi-donor mission stated that:

> "....a revolutionary land reform programme is needed to achieve the Government's objective for a total transformation of the agricultural base of the economy" [UNDP (1980b), p 5]

It argued further that this could only be achieved by

[1] establishing viable small family farm units, and

[2] applying a proper management system to village grazing land and mountain pastures.

The mission also stated that:

> "It is for consideration whether donors should limit new commitments to the agricultural sector until a land reform programme is agreed to by the Government of Lesotho and a plan of implementation formulated" [ibid. p 9].

A new land tenure law was passed by the legislature in 1979, which was intended to meet the demands of the World Bank and other donor agencies for permanence of tenure for farmers. It came short of permitting exclusive ownership of land, but made provision for the issuing of licences to farmers for the exclusive right of use of allocated fields. Ninety year leases would be issued for residence sites. The law permits improvements to be made on the land, which may be transferred through inheritance, but may not be sold without the approval of the government. Land allocations are to made by a committee headed by a chief. Committee members were to be elected or appointed citizens, who could, in principle, vote out the chiefs' decisions. The bill thus reduces the most significant remaining

power of the chiefs by weakening their authority over land allocation. The government argues that this new system enhances the security of land tenure and will persuade farmers to invest in improvements, which, in turn, will permit the possibility of moving from subsistence agriculture to cash cropping.

Topsoil and water are two of Lesotho's most valuable resources. Both are being wasted by a spectacular process of erosion. This erosion has been going on for more than a generation despite the installation of a basic protection system of contour banks on virtually all arable land. The surge of water down inadequately vegetated slopes is obviously destroying topsoil by gully formation, particularly in the lowlands. But, the widespread sheet erosion which accompanies such runoff, although much less visible, is far more deleterious and has resulted in the general reduction of fertility on both range and cultivated land. The conservation of soil and water is particularly difficult in Lesotho because of physical factors which cannot be changed: rugged topography, intense summer rain storms, cold winters, and, in the lowland, highly dispersible soils. However, the natural potential for erosion is aggravated by forms of poor land use, especially overgrazing, poor cropping, and the cultivation of unsuitably steep land or of land without adequate protection. All of these can, however, be changed. [SFYDP, p 3].

Climate

Another important factor which determines agricultural potential is precipitation. The average annual rainfall of a particular region in Lesotho, along with the average temperatures, is determined largely by the altitude, and distance from the escarpment. There is a general tendency for the annual mean rainfall to increase as one moves

from West to East, and from South to North. Almost all of Lesotho is within the 600 mm isohyet, and the mountain regions receive up to 900 mm per annum. In the extensive Senqu valley, though, mountain ranges interrupt the passage of rain clouds from both the East and the West, and the mean rainfall is considerably less than that in the lowlands.

The undeniable advantages of a high annual rainfall in Lesotho must be weighed against two major climatic short-comings. Firstly, precipitation has a markedly seasonal character. Over 85 per cent of the annual rainfall comes in the summer between the months of October and April [Ambrose (1976), p 25]. This is ideal for the cultivation of maize and sorghum, since both require intensive rainfall during their growing seasons (3). But the timing is critical, especially for sorghum. The onset of the spring rains, awaited with such anxiety every year, is fairly unpredictable. Planting later than October is fraught with risks, as this will delay the whole growing cycle, and crops are likely to be destroyed by early autumn frosts if they have not reached maturity by March or April. Excessive or violent precipitation is a further climatic constraint, and can cause fields to become waterlogged, thus delaying ploughing early in the season. Rain often falls in short, violent storms which accelerate soil erosion and which may damage crops. Hail can also be severe, and not infrequently causes serious damage to wheat harvests, as well as to peas, beans, and sorghum.

Secondly, there is a high frequency of droughts. General droughts affecting the entire region have been recorded at fairly frequent

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(3) The growing season for sorghum is 9 months from August/September to May/June; and for maize, 6 months, from November to May/June.

intervals and, even in the years between these droughts, crop yields can be drastically reduced as a result of rainfalls lower than average. High summer temperatures can also severely damage crops and reduce yields, even when the average seasonal rainfall is favourable.

Clearly, climate is one of the major constraints in agriculture. Many farmers believe that their most serious problem is drought. Hail is also frequently mentioned as a potentially devastating threat [Senqu River Agricultural Extension Project (1977a), pp 14,15]. Basotho village life is greatly affected by the precarious extremes of the weather. Rain is often accompanied by ferocious thunder and electric storms. In a landscape devoid of trees, people and animals are exposed to lightning strikes, which annually claim a number of victims.

Climatic extremes are most apparent in the mountain region, where frost can occur in any month. Although the mountain region receives the highest rainfall, climatic extremes create harsh conditions for rural living and agricultural production. At various times of the year, snow, sleet, lightning, hail, or dust storms may be experienced, and temperatures can range from -10 °C in June or July, to 35 °C in January [Ambrose (1976), p 27].

Ecological Zones

Lesotho is conveniently divided into four principal ecological zones: the lowlands, which consist of arable plains along the Western edge of the country, bordered by the Mohokare (Caledon) River and the Orange Free State, with an altitude of between 1500m and 1800m above sea-level, and dotted with small plateaux; the foothills, to the East of the lowlands; the mountain region, comprising the Eastern three-

quarters of Lesotho, and rising from 2100m to just under 3500m above sea-level at Thabana-Ntlenyana (the highest peak in Southern-Africa); and the Senqu River valley, which stretches into the mountain region from the South-West (4).

Geologically, Lesotho is relatively uncomplicated. Standing almost anywhere in the lowlands, one can see at a glance the country's geological history. Clearest of all is the horizontal boundary between the white sandstone and the darker basalt rocks of the Maluti (the mountain region). This boundary usually occurs at about 1800 m above sea-level. In the west, the basalt has frequently been weathered away, leaving isolated sandstone plateaux. Running across the country are dolerite dykes, which were formerly lava fissures. Many a footpath, or even a road, makes it way up the sandstone escarpment by means of a trough caused by the faster weathering dolerite. The dolerite itself is used for surfacing roads and many dykes have become quarries. Where dykes cut across the plains they form barriers impermeable to underground water, and provide useful sites for boreholes.

Crop Production

The land has been intensively used for over a century and continues to be farmed mainly for subsistence. Only 390,000 ha. (or 13 per cent of Lesotho's total area of 3 million ha.) are classified as arable (5). The staple crops in the lowlands and foothills are maize

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(4) Lesotho is the only country in the world with all its land situated more than 1000m above sea-level [Ambrose (1976), p21].
(5) Ministry of Agriculture (1978), p VI-3.
The area of Lesotho is approximately 30,300 sq. km., which makes it similar in size to Belgium.

and sorghum, with wheat being more common in the mountain region. Some cash cropping, notably of white haricot beans and peas, also takes place and about half the households in Lesotho also grow garden vegetables (6).

Spring ploughing and planting are the first and most fundamental of the season's agricultural tasks. There are few tractors in Lesotho and the advantages which they offer, in terms of greater speed and efficiency of ploughing, are often offset by the difficulty in being able to book a tractor contractor when field conditions are at their best. In the marginal agricultural conditions of Lesotho, the returns to the extra investment in tractor ploughing are, at best, uncertain for many peasant farmers. Indeed, it has been argued that where land continues to be cultivated by individuals and fields are not amalgamated for the purpose of mechanisation, cattle are a more suitable source of traction [Turner (1978), p 132].

The earlier method of turning the soil with a hoe before planting, is now rarely encountered. Instead, animal drawn metal ploughs, either with fixed or reversible mouldboards, coulters and often a wheel in front of the share, are almost universally used. These are generally imported from South Africa and are distributed through rural trading stores or government village distribution points. From two to eight oxen are used as draft animals, although cows and occasionally bulls are also yoked into the teams. Yokes consist simply of straight wooden poles, with pegs inserted on each side of the animals' neck, and are secured with straps of hide or woven grass ropes. When

(6) In 1950, maize and sorghum accounted for nearly 80 per cent of planted area. In recent years this figure has fallen to less than 60 per cent - reflecting a shift to cash crops such as wheat and beans [Ministry of Agriculture (1978), p VI-3].

ploughing, men and boys leave the village early in the morning with their oxen yoked together to pull a simply constructed sledge transporting the plough to the fields. Ploughing is traditionally undertaken exclusively by men, although, latterly, women might occasionally be seen assisting. One person holds the plough, and one drives the oxen, usually with a long whip which is kept whirring over the animals' backs, while they are urged on constantly with cries and whistles. Seeds are generally broadcast by hand, although some farmers are beginning to use animal drawn planters. The latter, however, often develop minor mechanical faults, which frequently remain unattended to. Although use of a planter helps to ensure correct planting depth and economical seed dispersal, factors such as lack of technical knowledge or support services tend to impede maximum efficiency. Harrows are more commonly used; it is a cheaper implement and less prone to breakages. Often it consists of little more than a crude metal frame set with spikes, and is drawn by only two animals. Women also spend mornings in the fields at this time, following the men at a later hour with buckets or tins of beer and basins of food for the workers.

There is a general shortage of farming resources in Lesotho, and over one half of rural households rent or borrow farm equipment (7). Most villagers experience difficulty in getting their lands ploughed and planted in time. Adequate draft power is scarce and after the dry winter, most draft animals are weak and underfed. Surveys have shown

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(7) In a survey in the Thaba Tseka Project area, 53 per cent of the households exchanged and combined resources with another household. Most of these arrangements were for ploughing. About a third of the households participated in sharecropping arrangements, although only 10 per cent of the total cultivated land was involved in sharecropping [Thaba Tseka Mountain Development Project (1977a), pp 18-21].

that in some areas, especially in the lowlands, only half of rural households own any cattle and only a third claim to have sufficient draft power available [Senqu River Agricultural Extension Project (1978), p 8].

A high percentage of rural Basotho enter into share-cropping partnerships (seahlolo) with one or more others, either to work their own fields or to have part use of someone else's fields. Share-cropping is an established institution for the distribution of factors of production. Rural households, which would otherwise be unable to plant and harvest crops due to shortages of these factors, enter into agreements with other households. The key factors of production are land, labour, tractive power, implements, seeds, and food for those working and various combinations of these factors are encountered in the contributions of the two parties to the sharecropping arrangement. Typically, one party may contribute land, seeds, and, perhaps, food for the labourers, whilst the other party may contribute oxen, implements, and labour. It is generally a formal arrangement spanning a full season from ploughing to harvest and involves the distribution of the harvest between the two parties in a fixed proportion. The most common practice is to divide the yield equally.

Although the use of fertiliser has increased over the years, the proportion of Basotho land-holders applying fertiliser to their fields is still low. Basotho are well aware that fertilisers increase yields, just as they know that natural additives such as manure improve the soil's fertility. Few land-holders have the ready cash with which to purchase fertiliser, and are sceptical of recouping their investment with a good crop, as yields may still be reduced through drought, frost, or pests. It may often be a wiser decision

to buy food than to buy fertiliser. Dung is also rarely applied to the fields as it is used chiefly as a fuel.

Pesticides are rarely used, although most farmers refer to worms and caterpillars (seboko) and specifically cutworms (seseli) as being a hazard to crop production [Thaba Tseka Rural Development Programme (1979b), p 21].

Traditional Sesotho farming knowledge included techniques for driving seseli out of farmers' fields. A traditional doctor would burn some worms in a pot, together with the roots of certain plants, and it was believed that the odour would draw the worms out of the fields to open places where they would be devoured by ants [Ashton (1967), p 127]. However, contemporary farmers generally tend to be scornful about traditional Sesotho techniques.

After fields have been ploughed (and perhaps harrowed) and the crops planted, operations which rarely occupy more than two or three weeks in total, there is an hiatus until it is judged to be time to begin weeding. Nearly every household owns at least one hoe, which is the principal tool for weeding. If ploughing and planting are the most essential, weeding is the most tedious of agricultural chores. At the height of the weeding season, in high summer, a conscientious woman will spend many hours a day in the fields. She may call a working party (letsema) if she can afford to feed them and is sufficiently popular to attract people away from their own lands.

The haphazard collection of green maize may occur in late summer and autumn, but the full crops of both sorghum and maize are generally left to dry for some time before finally being harvested in the winter months of June and July. More concentrated efforts to harvest

the crop quickly tend to be made with wheat and beans, in which case a family may work for most of the day or be joined by many other people in a letsema working party. Wheat is reaped with sickles and is stacked into a small rick at the side of the field to await threshing.

Harvesting and threshing do not place a heavy demand upon the time of the Basotho land-holder. Both operations tend to be carried out haphazardly, when the time and inclination present themselves. All in all, the contribution of the Basotho as farmers to the production of food is not great; most land-holders prefer to perform the bare minimum of tasks necessary to enable them to gather some crop from their fields at the end of the season. Estimated average labour inputs for current crop production practices in Lesotho are shown in Table 4.1.

Crop	Land Preparation	Planting	Cultivating	Weeding	Harvesting	Total
Maize	4.2	1.5	1.2	8.5	17.5	32.9
Sorghum	4.2	1.5	1.2	8.5	13.6	29.0
Wheat	4.2	1.5	-	-	11.8	17.5
Beans	4.2	1.5	-	-	12.4	18.1
Peas	4.2	1.5	-	-	12.4	18.1

TABLE 4.1 : Annual Labour Input Requirements for Current Crop Practices in Lesotho (Man Days per hectare).
Source: Ministry of Agriculture (1978), p VI-8.

Note: It is assumed that land preparation (including ploughing and harrowing), planting (including fertiliser application), and inter-row cultivation are performed with ox power. Hand operations include weeding and harvesting (picking and/or cutting), stacking, threshing, winnowing, sizing (in the case of beans), and transport to village.

Few households can live on their crop output alone - holdings are too small, natural conditions are too poor and the investment of time and effort by land-holders in their crops is too low for agriculture to make more than a supplementary contribution to subsistence. As one project report summarises the situation:

> "Farmers plough normally only once, mostly plant home-grown seeds, use animals for draft power, rarely harrow their fields, plant the seeds at the same time as they plough, only rarely use fertiliser, weed the crops usually only once, do not irrigate, rarely protect against insects, and harvest late. The main reasons they give are lack of money, knowledge [sic], labour and power. The low level of farming practice combined with the severe climatic and soil problems of Lesotho combine to make the country's agriculture very unproductive. Farming thus becomes a risk which is too great to justify sustained effort, which in turn aggravates the farmers' poor attitude towards farming, and so continues the cycle of unproductive farming" [Senqu River Agricultural Extension Project (1978), p 17].

Livestock Production

Although arable farming continues to be the principal target of aid for production in Lesotho, agriculturalists and planners working there are becoming bolder in their private assertions that much of the country is not particularly well suited for crops and more attention should be devoted to livestock production. It is certainly true that most of the country is mountainous and covered in grassland suitable for livestock grazing.

Investment in grazing stock is the main form of private investment in the agricultural sector. More than half the rural households own cattle, sheep or goats, but the numbers are far from evenly distributed (8). Cattle are grazed on communally held ranges, mostly in the mountain region, and after the harvest they are permitted to

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(8) Less than 10 per cent of households own nearly half the nation's cattle [Ministry of Agriculture (1978), p VII-11).

graze crop residues on cultivated land. The number of grazing animals far exceeds the carrying capacity of the land (9). The deleterious consequences of overstocking and generally poor herd management - severe gully erosion, and undernourished and poorly bred animals - have persisted in Lesotho for many years and have come to be expected as unavoidable side effects of livestock ownership.

Livestock have multiple uses within the Sesotho agricultural economy and culture. Cattle provide draft power, food and, in time of emergency or need for cash, marketable assets to the rural household. Sheep and goats are largely valued by the Basotho for their market value in wool and mohair, and for domestic consumption. Horses and donkeys continue to be the most commonly used means of transportation. The use of livestock must also be understood in terms of the particular roles which different animals play in social relationships of reciprocity and redistribution. Cattle, being the most prestigious animals, are prominent in important social events such as weddings, funerals, and special religious occasions. Through the social conventions of mafisa (the letting out of grazing animals to be managed by another household) and bohali (bride-price), the transfer of grazing animals between families and villages over time has been considerable.

Mafisa is a system whereby livestock are lent to relatives and close friends who make use of the products of the animals (10). At its

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(9) Recommended stocking rates range between 41 and 67 per cent of the actual livestock population (1975) [Ministry of Agriculture (1978), p VII-8].

(10) A survey within the Thaba Tseka Project area determined that 37 per cent of the households have livestock out on mafisa, and 26 per cent of farm households manage livestock for other owners [Thaba Tseka Mountain Development Project (1976), p 28].

best the system offers a means of support and welfare for poor relatives and friends by providing them with milk, wool, and traction. At its worst it is a system whereby rich households with accumulated livestock can ensure that their herds are well looked after.

Livestock and cattle have assumed traditionally an important function in Basotho society as bohali (bridewealth). As a potential bearer of children, a wife is regarded as a source of labour, and the payment of bohali by the husband's kin to hers is in compensation to the latter for the loss not only of her own labour but that of the children she may produce [Murray (1976a)]. Customary demand and the level of payments, in these transactions, are high by any comparative standard, and the payment of bohali commonly extends over many years. The standard payment is 20 cattle, together with 10 small livestock and a horse, but the total is rarely reached, even after the husband's paternity has been acknowledged and full formal agreement has been reached between the two families. If, as is often the case, cattle are not available in the man's household, the principal alternative means of payment is cash. A portion might also be paid in other material goods. Clearly, the struggle to acquire and maintain a number of cattle for potential bohali negotiations, has caused most rural households to concentrate on quantity rather than quality in livestock rearing. It has been pointed out, however, that the physical role of cattle in marriage transactions is declining, and that the most important function of cattle in Sesotho life today is as source of traction for agriculture and transport [Turner (1978), p 140].

Livestock practices have remained virtually unchanged for a century or more, despite the efforts of colonial and international aid

"experts" to commercialise it. It has been noted that in relation to crop production, livestock husbandry appears to be less risky, requires less operating costs and, in most instances, offers a higher payoff in terms of net returns to family labour. It should be remembered that the domestic consumption of livestock products is of immense importance as a contribution to the subsistence and survival of rural households. It has been estimated that the annual domestic utilisation of livestock and livestock products amounts to a market value equivalent to about three times the gross revenue earned from exports [Ministry of Agriculture (1978), p VII-3].

Village Technologies

Apart from crop and livestock production, technologies utilised by rural Basotho revolve chiefly around the processing of grain, and also housing construction.

Grain Processing

Threshing of wheat is done by hand, usually on a patch of beaten ground or a smooth, flat rock (seotlo). The threshing of sorghum and beans is also commonly done on a seotlo. Maize cobs are usually brought back to the village in sacks where they are threshed and shelled in spare moments. Threshed grain is often stored in large woven grass baskets (sesiu).

In the more remote parts of Lesotho, some wheat and maize is still ground by hand with a small flat stone (siloane) on a larger stone (leloala), whose top is smoothed and hollowed. Grinding grain by hand is extremely time consuming and many hours work are necessary to produce enough flour for just a couple of days. Increasingly, many

households take their grain to be ground by a diesel powered hammer mill at one of the trading stores, where cash has to be paid for the service. A common sight in the mountain region is trains of donkeys transporting sacks of grain on their backs to be milled at the nearest trading store.

The staple village diet is maize (poone). Nearly three-quarters of rural families consume all the maize which they produce [Senqu River Agricultural Extension Project (1978), p 22]. It is eaten in kernels on or off the cob, or in the form of porridge. Some sources suggest that the importance of maize as a household crop has declined - despite its continued importance in the rural diet - because an increasing number of families can afford to purchase imported, ready ground maize [Turner (1978), p 164]. Sorghum (mabele), on the other hand, provides the most traditional and best-loved items in the Basotho diet: various sorts of porridge and, above all, joala. The latter is a home brewed beer and is itself quite nourishing. It varies in alcoholic strength, depending on the length of fermentation, and may lead to severe inebriation. When sorghum is plentiful, a woman will brew as much as her clay pots, or assortment of tins, will allow. A common sight in Lesotho is a white cloth or plastic bag fastened to a make-shift flag-pole outside a hut, indicating that beer is available for sale. The brewing and sale of beer by poorer households is one of the chief mechanisms for the partial redistribution of migrant remittances in the village.

Sour bread is made from ground maize and also from wheat flour. A high proportion of the Basotho's diet consists of carbohydrate, to the extent that the incidence of deficiency diseases is relatively high. Left over chunks of dry cold porridge are eaten for breakfast,

and as sustainers between meals by those who spend the day around the house.

Meat is eaten only on very special occasions, when a sheep or cow might be slaughtered. Only two fruits grow indigenously: small hard peaches, and the succulent fruit of the prickly pear in the lowlands. Some households tend small vegetable gardens. Mohoho , a wild, small-leaved vegetable, which tastes of strong spinach, is collected; it is found sparsely scattered between crops and along the edges of fields and paths.

Fuel

Porridge is cooked for more than an hour, and bread is steamed for nearly an hour and a half, but fuel is extremely scarce in rural areas. There are very few trees in Lesotho, which is predominantly a grassland. In the remote valleys, indigenous trees such as the Cape willow (Salix capensis) and the wild olive (Olea africana) can still be found, and introduced species such as the weeping willow (Salix babylonica) and the white poplar (Populus alba) propagate along the edge of rivers. These trees are carefully protected by village custom; they are used sparingly, and mainly for building purposes. Given the almost total lack of firewood, most households depend on dried animal dung (lisu or khapane) for their supply of natural fuel. It is collected from livestock kraals , and open fields, and is first stacked in piles to be thoroughly dried in the sun. A gorse like bush (Chrysocoma tennifolia or Aster filifolius), known to the Basotho as sehala-hala, is used for kindling. It grows sparsely, and only in the foothills and mountain region. Women and young girls spend long hours collecting huge bundles, which they transport on their heads. Lisu is preferred for both cooking and

warming the house, and it burns with little or no smell. Cooking is performed over an open fire, usually built on the floor in the centre of the hut. Paraffin stoves, which are freely available from most trading stores, are used for short cooking operations, but the fuel is expensive and is increasingly beyond the means of many households. Electrification is confined to a handful of towns along the border with South Africa in the West, and apart from a few standby diesel generating plants, is supplied from South Africa's ESCOM grid.

Housing Construction

Rural Basotho live in small scattered villages which are frequently sited in rocky places: for obvious reasons, houses have not generally been built on land where crops can be grown.

Dwellings are traditionally built in the form of circular stone-walled huts (rondavels), roofed with willow or poplar rafters, and thatching grass. In the lowlands and foothills, sandstone is readily available, and is cut to size for building purposes. In the mountain region, individual basalt stones are collected and arranged in walls with a mud and dung mortar. The allocation of building materials is controlled at the village level. Permission has to be sought from the chief for the cutting of trees from the village woodlot, and for the cutting of thatching grass.

Floors are smeared with a dung paste and are often decorated with finger drawn designs (matsema), which are renewed periodically. The inside walls and the ochre around doors are also often etched in geometric patterns. Rural women retain a high degree of environmental knowledge concerning various types of soil and their usefulness for plastering and decorating walls and floors [Turner (1978), p

207].

Increasingly the traditional rondavel is giving way to the modern rectangular shaped stone or cement block houses with zinc sheet roofing, in spite of these new materials' inferior thermal insulating properties. In the more remote areas, modern building materials are virtually unattainable, and a high degree of masonry and thatching skills persist. It is interesting to note, that as one approaches the more developed areas (including rural development project centres), many of these skills have been lost, and the quality of building workmanship is visibly poorer.

Other Village Technologies

Paradoxically, water supply is a perennial problem in Lesotho; for although rivers and streams are plentiful, the country nevertheless experiences periodic droughts. There are few irrigation schemes and very few villages have piped water supplies. This is partly because villages are seldom located in valleys, which are generally narrow and steep sided. There has been little indigenous development of pumping devices, or of energy sources to power them. Most village water supplies are taken from springs, which are generally protected with makeshift stone walls. These are often situated up to an half-an-hours walk from the village and a great deal of time can be spent by women collecting water in large vessels, which they manage to transport by balancing them on their heads. There has been limited development of gravity piped water from springs into villages. The Basotho are hesitant to drink from rivers as clothes are washed in streams and the waste disposal areas of many villages are situated near streams and rivers.

Clothing is now almost exclusively Western in style and origin, with all clothing being imported from outside the country. One variant is the Basotho blanket which dates from Colonial times and often still is made in Britain. These blankets have become something of a national dress and they are worn most frequently in the mountain region, even in the hottest weather. A vivid image retained after travelling through the mountain region, is the sight of Basotho, on horseback, wearing their colourful and patterned blankets, and occasionally the traditional conically shaped Basotho grass hats.

Many technical skills persist in the villages. Grass is woven into mats and also ropes, which are used as halters for their ponies. Hides and skins are cut into strips and also woven into ropes. Clay pots, some of considerable size, are still made in some areas.

Rural Perceptions and Technical Knowledge

Aspects of rural and agricultural technologies which resemble more closely the practice before the pattern of close, settled cultivation was established, incorporate an intricate array of relevant traditional technical knowledge. Detailed knowledge concerning, for example, different types of grazing grasses or wild vegetables suitable for eating, assist the Basotho to survive successfully in an often inhospitable environment. This is also true of other areas of village life, such as building techniques.

Although many of these skills and much of this traditional knowledge has remained relevant to day-to-day rural living and survival, many other traditional agricultural practices have not been successfully adapted to changing conditions. This is particularly true of some of

the crucial aspects of agriculture such as knowledge of soil and crop types and cultivation techniques where traditional Sesotho knowledge has become less and less effective. Furthermore, although the importance of identifying and combating pests is widely recognised, traditional modes of response are adopted with decreasing frequency, without yet being replaced by any effective alternative. With regard to increasing the fertility of the soil by applying additives or returning nutrients to it, the Basotho today - despite what they know of chemical fertilisers - probably do less than their forefathers, who had a more luxurious resource base to exploit.

It can be argued that Basotho farmers adopt a minimalist technical approach to farming. New farming knowledge and skills have not in general matched the transformation which has taken place from casual cultivation amid abundant resources to the annual exploitation of small, and fixed, parcels of land.

The Basotho, however, have been more successful in creating and adapting forms of social organisation which have facilitated their survival as an agrarian nation over a century of conflict and pressures. The pattern of land-holding altered at an early date in response to the new technological opportunities offered by the plough, and the system of land tenure has continued to function fairly effectively in sharing the land equitably as a subsistence resource.

Nevertheless, Sesotho agricultural knowledge has not developed significantly this century and the Basotho have been unable to innovate and adapt agricultural technologies to improve productivity. Instead, land-holders have been forced to make decisions, in the face

of economic pressures and opportunities which have led them away from the land, but which, at the same time, have not permitted them to ignore it. Farming is not worth their while, but their subsistence still requires it. Opportunist exploitation, rather than dedicated husbandry, is the predictable response to such conditions [Turner (1978), p 236].

Again we are brought back to the force of our original analysis. Central to the transformation of technical knowledge and the adoption of new techniques has been the historical process which has shaped Lesotho's political economy, and hence the attitudes of the Basotho to agriculture and technological change. The requirement to enter labour migration has meant that agriculture has remained a subsidiary, although still necessary, productive activity. Decisions concerning investment in technological change are thus governed by perceptions of the comparative value of returns from agriculture in relation to migrant earnings.

These attitudes to technological change and innovation are interwoven with general cultural perceptions which are defined by the material conditions of rural life. The Basotho are continually interacting with Western culture within the regional economy. Radio advertisements, magazines, the experience of Basotho migrant labourers in the metropolitan centres of South Africa, and the lifestyles of expatriates and the educated elite within Lesotho itself, all serve to transform general Sesotho aspirations and perceptions.

Ultimately these perceptions are most forcibly shaped by the labour strategy of mining capital within the regional economy, and the philosophy of apartheid, or separate development, which it evolved.

This philosophy asserts that black societies (including the Basotho) should retain independent cultures, whose separateness should be preserved within political units located in designated rural areas, whilst still providing the labour necessary for accumulation in the metropolitan centres. In reality, of course, this has meant political domination and economic exploitation by a white minority over the majority, but it also involves a form of cultural domination.

A degree of cultural domination is likely so long as Africans are forced to participate in the Western capitalist economy on unequal terms. This is demonstrated in labour migration where "pull" factors, such as the desire to emulate lifestyles and obtain consumer goods which are available in urban centres, begin to operate with the economic and political "push" factors which gave rise to labour migration in the first place. Material aspirations change and alien tastes in clothing, food, and household goods are adopted. Many Basotho aspire to Western cultural norms and often denigrate traditional aspects of rural life. Yet coupled with these aspirations is the prevalence of a national pride, and a reliance on indigenous forms of social organisation and productive activity, to regulate their existence in Lesotho. For the system which dominates them, and seeks their labour, also requires that they contribute towards their subsistence through their traditional agricultural activities.

The material and social aspirations embodied by contemporary Sesotho culture affect strongly its perceptions of farming as the Basotho find their security in an agricultural base. But, although farming is essential to their subsistence, its potential as the means of prosperity and happiness is limited. Each innovation undertaken by the Basotho, each positive or negative reaction to a development

initiative, is shaped by these perceptions. When rural development seeks to strengthen the security of these agrarian foundations, the Basotho are likely to react with interest. The same is likely to be true of other rural development initiatives such as improved water supplies, access tracks, clinics and any programme aimed at making rural life easier. But, when rural development has more grandiose or less tangible ambitions, involving a higher degree of risk, the Basotho are likely to be politely non-committal, and development programmes are bound to fail through lack of participation by the people.

HISTORY OF BRITISH COLONIAL INVOLVEMENT IN RURAL DEVELOPMENT

The history of attempts to reverse the inexorable decline of production in the rural regions of Lesotho provides a fascinating (and unfortunate) example of the problems involved in introducing technological change and rural development. The British Colonial administration, and the subsequent post-independence government, aided by international aid agencies, have introduced a succession of rural development programmes which were designed to raise agricultural productivity , to improve rural living conditions, and to enhance Lesotho's social and economic development. These programmes have all involved attempts to encourage technological change, with varying degrees of success, and perhaps more, of failure. This section will trace, in broad outline, the history and extent of Colonial rural development programmes in Lesotho in order to examine which factors shaped the nature, content and adoption of these programmes and the new or improved technologies which they attempted to introduce.

It has already been noted that, during the early period of Colonial

rule, the British effectively neglected agricultural and infrastructural development and were concerned rather to incur the minimum of expenditure, while ensuring that Basutoland developed chiefly as a labour reserve for mining capital in South Africa.

There is, however, a long history of government intervention in rural development in Lesotho - although many of these early efforts were meagre and ineffectual. Colonial Reports record that District Commissioners distributed food crops and tree seeds free of charge and imported Arab stallions in order to improve the breeding of the Basotho pony. When the British did eventually attempt minor involvement in rural development, it was directed primarily towards soil conservation; there was a recognition that, as an agrarian nation, Lesotho's land resources are of prime importance.

Colonial Soil Conservation Programmes

In spite of ample signs of erosion damage dating back at least to 1850, the British colonial administration made no serious remedial attempts until the early part of the twentieth century. The first evidence of official attention to the soil erosion problem dates from 1902, after the publication of a report by Sir William Willcocks, who remarked that:

> "The denudation of the country, owing to....ravines, is very serious, and if allowed to continue for as many years in the future as it has during the last thirty years, the loss to the country will be incalculable" [Willcocks (1901), p 31].

Subsequent government rural development assistance was focused initially on tree planting recommendations, but some crop management advice was also included [Nobe and Seckler (1979), p 3]. The Department of Agriculture in Basutoland was established in 1910, and its

work prior to the mid-1930s was directed mainly towards providing veterinary services. The Department's limited soil and water conservation activities continued with tree planting schemes and included some donga (gully) control, rather than with any efforts directed towards reducing the rate of runoff and sheet erosion on crop and rangeland. An agricultural officer was appointed in 1911, but work practically stopped during the First World War and the officer returned to the territory only in 1921. Rural development efforts were still insignificant; the grant for donga prevention in 1928, for example, was only £1500. Three agricultural demonstrators were engaged, but fresh dongas were continually forming and being allowed to develop.

The British government only became really concerned with Basutoland's dependence on its agricultural resource base in the early 1930s, at which time accelerated soil erosion was already clearly evident [Fitzgerald-Lee (1951)]. The Secretary of State for Dominion Affairs appointed a Commission "to enquire into the position of Basutoland from the financial and economic points of view and to report thereon". In 1935, Sir Alan Pim's report was published and it identified:

> "....the greatest need of the Territory [as being] the initiation of measures to deal with the erosion which is steadily ruining the country" [Pim (1935), p 134].

The situation was exacerbated by very heavy rainfalls, after some years of severe drought, and the rate of soil erosion was visibly accelerated. Soon thereafter, a soil conservation programme was initiated. The first phase, from 1935 to about 1950, focussed mainly on mechanical structures and on tree planting with a budget of £160,000 being made available to carry out the recommended measures.

Mechanised equipment and skilled personnel were imported and, with the deployment of large contingents of Basotho labour, the early goals had, by 1945, largely been achieved: 62,000 ha. of arable lands (44%), out of some 142,000 ha. in the lowlands had been protected with terracing; out of a mountain area of 182,000 ha., 35,000 ha. (18%) had been protected with buffer strips; 179 dams, with an average capacity of 7,700 cubic metres, had been constructed; and over 822,000 trees had been planted [Nobe and Seckler (1979), p 57].

In 1943, as a consequence of the shortage of mechanical equipment and funds during the Second World War, the High Commissioner in Basutoland suggested an extensive tree planting campaign which was of low capital intensity and which could be carried out almost exclusively with Basotho labour. The objective of this scheme was the binding of soil with tree roots in badly eroded areas. At the same time, the resulting plantations would also provide a fuel supply, thus releasing dung for field fertilisation. Again, these early efforts were considered to be a success and they led, in part, to the allocation of £830,000, in 1945, for the second ten year development programme, of which 36 per cent was earmarked for the agricultural sector. A follow up grant of £133,000 was provided, in 1950, for the same purpose. A great number of trees were planted, but it has been estimated that less than 10% survived. [Nobe and Seckler (1979), p 66].

In 1952, the Department of Agriculture in Maseru reported that approximately two-thirds of the arable area in the lowlands had been protected by terraces and grass strips, that about three-quarters of the foothills had been protected with grass or buffer strips and that the whole mountain area was due to be completely protected by the

following year. One publication noted:

> "Grazing control has been successfully introduced and is being rigidly enforced by many of the chiefs; mountain sides and valleys are being ungrazed for as long as a year, and the ravaged grasslands are being given a chance to recover" [Fitzgerald-Lee (1951), p 523].

By the mid-1950s, the essential recommendations of the Pim Report had been substantially implemented [Nobe and Seckler (1979) p 58]. It has been calculated that, over twenty years, the whole programme worked out to an investment of approximately £1.50 per ha. of arable land protected with conservation structures (11). This was, in organisational and physical terms, a remarkable achievement. Contemporary research publications by outside observers were enthusiastic about the fight against erosion, which was regarded as the finest conservation work in sub-Saharan Africa [Fitzgerald-Lee (1951), p 523].

But, by this time, a new policy direction in the country's soil conservation programme had already begun. Lack of maintenance of installed conservation works had emerged as a major problem; and British technical and administrative personnel had begun to realise that the system had largely been a failure. Deterioration of pastures had increased, thus further endangering soil resources. Anti-erosion works appeared to have had only a limited effect and soil erosion was continuing unabated. The direct participation of farmers in the programme had effectively been limited to their employment as manual labourers. Very little educational work had been undertaken to convince them of the importance of conservation measures. Some of the conservation works were badly constructed and emptied into *dongas*, thus aggravating the erosion process. It is clear that very

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(11) 12/- per acre [Quirion (1958), p 125].

little research and monitoring work had been undertaken, despite Pim's recommendation that survey, observation, and experiment were necessary to ensure the effectiveness of the programme. The work had been focussed almost exclusively on the physical achievement of preconceived objectives.

During the first ten years of the programme, the British administration had been almost wholly responsible for the construction and maintenance of the conservation structures. Many farmers began to resent this work, particularly when contour banks were constructed which cut arbitrarily through fields allocated to different farmers.

During the Second World War, the construction phase, and also maintenance of structures, virtually ceased due to machinery, budget and technical constraints. Upon re-examining the structures after the war, the responsible technical personnel decided that it would be too expensive to reconstruct the many structures which had fallen into disrepair. Furthermore, it was considered that the maintenance of the structures should be the farmers' responsibility. The result was that many key sections of the original system were neglected, and breached terraces and grassed waterways subsequently turned into donga<u>s</u>. Enforcement regulations were introduced in order to try and ensure that maintenance activities were carried out. Naturally, these measures were resisted, and caused further resentment and suspicion on the part of the land-holders. The Department's policy for gaining the participation and understanding of the Basotho, were demonstrably inadequate.

The lack of enthusiasm and the refusal of the Basotho to assume responsibility for the maintenance of conservation structures has led

some writers to explain the individual farmer's failure to save his land in terms of "ignorance and apathy" [Quirion (1958), p 126]. However, it may be argued that, under the country's land tenure rules, all land is held in trust by the Paramount Chief. The state had thus initiated conservation schemes on its own land and peasant farmers expected the government to protect its own investments. If this is accepted, it is hardly surprising that the conservation measures were bound to fail after the government ceased to assume responsibility for their maintenance.

In the event the effectiveness of the much admired physical system of conservation structures was to a large extent vitiated by an inadequate policy of encouraging participation and understanding by those most affected by these efforts of rural development.

Colonial Rural Development: Phase II (1950-1966)

During the decade of the 1950s, a new policy of rural development in Lesotho was initiated which sought to overcome these problems. At that time colonial thinking was moulded by new concepts and ideologies which stressed the value of consultation with local people and the encouragement of community development and self-help (12). Pilot projects were started which served, subsequently, as prototypes for the area based projects in Lesotho funded by international aid in recent years. Some of the more important projects will be reviewed briefly below.

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(12) It is interesting to note also the influence of American thinking on British colonial agricultural policy at this time. It was argued that: "One complete watershed should be taken and turned into a miniature 'Tennessee Valley Authority'" [Department of Agriculture Annual Report 1951, Maseru, p 12].

Tebe-Tebeng Valley Scheme

The Tebe-Tebeng Valley Scheme was the first of the pilot projects and was located in the lowlands in the North-West of the country. It covered an area of 16,000 ha. with a population of approximately 8000. Planning began in 1951, and the scheme operated on a grant of £85,900 by the Colonial Development and Welfare Fund [Nobe and Seckler (1978), p 74]. The main aims of the project were:

> "Construction of roads, protection of land by soil conservation methods, building of dams and establishment of cooperative group farms;.....the Pilot Project Team is to work with rather than for the people, and in its larger aspect the project will be an experiment in Community Development aimed at progress through the stimulation of local initiative and self-help" (13).

Other activities included grazing control, fish farming, irrigation, fruit tree planting, improvement of local cattle, the supply of agricultural inputs, such as improved seed, the sale of carts, the installation of village water supply systems, and the formation of Young Farmers' Clubs.

Substantial achievements were recorded in some of these activities. Lands were terraced, gully erosion arrested, and many trees planted. The Tebe-Tebeng Valley Scheme was considered to be a success in its early stages and was expanded to include mechanised agricultural inputs. Because of the acute shortage of animal draught power, and the importance of ploughing and planting soon after the spring rains, the potential of mechanisation as a means of speeding up this process had been recognised. However, the indiscriminate use of tractors in Lesotho is not automatically beneficial to the land, and their effect can be to speed erosion processes as much as farming operations

(13) Department of Agriculture Annual Report 1952, Maseru.

[Sheddick (1954), p 76]. This was one of the factors that prompted the government to set up an experimental scheme for Mechanised Group Farming as part of the pilot project with a further grant of £31,800. The object of the scheme was to amalgamate small holdings into blocks large enough for economic tractor operations. Four cooperative societies were formed, each with its own management committee. Members were charged for tractor ploughing, planting, discing, and harrowing.

The scheme, however, soon ran into difficulties. A great deal of money was lost due to farmers failing to pay tractor hire charges, the difficulties of organising economic land units, and confusion over ownership of, and responsibility for, the machines. No project evaluations appear to have been made but one writer noted that the project had shown that large-scale mechanisation projects were "impracticable in the Basutoland context" [Wallman (1969), p 118]. This study also revealed that there was a lack of seriousness in taking into account local peoples' views. There were reports of farming timetables being imposed, in spite of locally expressed reservations as to their suitability for the area. With subsequent low yields suspicion of the project amongst land-holders grew. It was also argued that the system of communication through chiefs and official committees did not work. Many of these problems were beginning to be overcome but the project, nevertheless, was closed in 1957, amid much resentment and bitterness (14).

The project marked the beginnings of Government concern for the human element in rural development projects but, because of the regulatory

(14) Nobe and Seckler (1979), p 69; Turner (1978) reports that the project was finally closed only in 1960.

and enforcement methods used, the problem of protecting government investments, including the maintenance of soil conservation structures, grew more serious as relations between the people and the Department of Agriculture deteriorated. The annual report noted:

> "The Department field staff have of necessity become involved in policing activities which are not strictly their responsibility. The feeling of the people towards the staff is reflected in their distrust of any attempt to introduce Extension work and their unwillingness to accept staff as the 'farmer's friend'" (15).

When, in 1958, it was decided finally to shift the Department's emphasis from regulation to extension, it was the realisation that the "regulatory approach" was not working, as much as the then fashionable appeal of extension philosophy, that decided the change. The official view noted:

> "It has become apparent to this department that the solution of the erosion problem is not to be found in mechanical structures alone, but in the reorganisation of the land use system....There has to be complete union of the sociological and technical procedures if any measure of success is to be achieved.." (16).

The first project in which all these factors were to be taken into account was the Taung Reclamation Scheme.

Taung Reclamation Scheme

The scheme covered an area of 49,000 ha. in the South-West region of the lowlands, in the Mohales Hoek District. Plans for the scheme originated from colonial government officers, who were concerned at the poverty stricken nature of the area, and the lack of attention given by the people to the proper maintenance of contour furrows and other mechanical works previously established there. The implementa-

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(15) Department of Agriculture Annual Report 1957, Maseru.
(16) Department of Agriculture Annual Report 1958, Maseru.

tion of the scheme was given further impetus by the representations of the Paramount Chief, who was struck by the appalling erosion visible when travelling through the region.

The scheme was to be preceded by a survey of the animal and human populations, land use, the types of soil, and their ecological potential. Based on this study, a first phase of the project was designed which would involve overworked land being rested, animals being sent temporarily out of the area to mountain cattle posts, and the closing of fields which were unsuitable for cultivation. In the second phase, land use was to be planned so as to maximise and sustain the productive potential of the area.

It was estimated that a quarter of the fields would have to be closed at any one time, and that land holders would stand to lose, at most, only one field during any particular period. The chiefs were to ensure that closure regulations were equitably allocated and it was also their responsibility to explain the purpose of the scheme to the people, and to ensure that animals were sent out to the cattle posts.

The survey was carried out in June 1956. By the spring of that year, the stock were ordered out of the district and, by the following winter, a proportion of the fields had been closed.

Again, the scheme was initially judged to be a success [Morse (1960)]. However, it soon became apparent that the regulations were only exceptionally being obeyed and, by 1961, the project was judged a complete failure. The Colonial Government decided to cut its considerable losses and withdraw from the project, despite several structures being left unfinished, and considerable resentment and insecurity being expressed by the local inhabitants.

One subsequent study of the scheme [Wallman (1969)] concluded that among the factors contributing to the failure of the project were:

[1] The administration and management of the scheme was confusing and cumbersome. At least three branches of government had some interest in its implementation, and each had officers in the field operating to different schedules and responsible to different administrative authorities.

[2] There was a shortage of staff and a lack of communication with the local people. Village meetings (lipitso) and extension work proved ineffectual, and officers were insensitive to the economic insecurities of the farmers. Land was never properly reallocated, and without land or animals there would be no insurance against starvation.

[3] Political divisions acted as a further constraint to the scheme. The chiefs were suspicious and resented the powers of the newly elected District Council. Some politicians were keen to exploit the difficulties experienced by the scheme, for partisan party purposes.

"Farmech" Mechanisation Scheme

This scheme was initiated by the newly elected Mafeteng District Council, which, in the face of opposition from the Department of Agriculture, recommended a project which would serve as a demonstration in mechanisation. The Council obtained a loan of £45,000 from the High Commissioner and, in 1961, the first six of the projected twenty-four tractors were delivered. Credit was to be made available to farmers to pay for tractor hire and it was anticipated that

increased income from increased crop yields would pay for the loans. Preparatory surveys were made of the number and size of fields, and of the likely demand for tractors.

The scheme soon ran into difficulties. The initial land measurements were found to be inaccurate, so that the listed size and the tendered cost of ploughing each field had to be raised by as much as 40 per cent. Over two years the scheme deteriorated; it lost money, ran down its capital equipment, and achieved nothing but increasing unpopularity.

Wallman (1969) argues that the factors contributing to the failure of the project were similar to those for the Taung scheme:

> "(i) an ambiguity of political leadership which entails the mutual distrust of the various arms of government and a minimum of cooperation between them, and which has undermined the confidence of villagers in any administrative or government instruction;
>
> (ii) a degree of economic insecurity so marked that the average villager could not sensibly take the gamble of innovation, even if he believed that the country's economic potential warranted the effort;
>
> (iii) a machinery of administration so cumbersome that executive action is hampered at every level, so remote from villages that decisions ~~decisions~~ must be taken without reference to the people they most concern, and so out of touch with rural life that there is little likelihood of plans being properly communicated or of their effect being controlled" [Wallman (1969), p 153].

Wallman concluded that:

> "...the absence of necessary political and economic conditions combined with certain deficiencies of administration and communication are basic to problems of rural development in Basutoland" [ibid, p 164].

The "Farmech" scheme, however, was revived. A qualified manager was appointed, as well as an additional six field organisers who managed

to establish a better relationship with the land-holders. The new manager knew the language and customs of the people and quickly gained their trust and confidence. It was made clear that the programme belonged to no one party and was meant to benefit all the people of the area. A share-cropping arrangement was initiated in order to ease the investment risk of the farmers. The scheme produced the only successful wheat harvest in the country in 1963, and the subsequent years appeared to hold equal promise. However, as few details of subsequent performance are available the final fate of the scheme remains unclear. Contemporary reports of the initial period of the second phase of the scheme indicate, however, that "Farmech" was

> "....providing a valuable service in the District and [had] a good chance of becoming the profit-making public corporation that the original planners envisaged" [Wallman (1969), p 152].

One of the key factors, contributing to the apparent success of the introduction of mechanisation and technological change in the second phase, was the degree of on site innovation, where tractor hire was combined with traditional share-cropping arrangements. The scheme thus highlights the importance of social aspects of technological change.

Thaba Phatsoa Project

This area, in the north-west of the country, received special attention from the Ministry of Agriculture for a number of years. The principal intervention was the construction of a large earth dam with a capacity of 3.4 million cubic metres. Other programmes involved livestock improvement, afforestation, home economics, nutrition, public health campaigns and the improvement of water supplies. Irrigation of lands began in 1963, and subsidiary reservoirs and fish ponds

were built subsequently.

Initially, the Conservation Division of the Ministry of Agriculture absorbed all irrigation, ploughing, and other costs. In the second year, land-holders had to pay for ploughing and fertiliser inputs. After two years the Government pulled out of the scheme and, rather ambitiously, handed over control to a local committee, whose subsequent operations were confused and ineffective. After a year of inactivity, the Irrigation Section of the Department of Agriculture's Crops Division took over the management of the scheme. It was expanded to cover 21 ha. and credit was provided to the land-holders. Technical problems were tackled, including the need to redesign the water channels twice before satisfactory functioning was achieved.

The project survived into the 1970s, although an economic appraisal, in 1972, revealed that the annual return per hectare was only M 57. In the early 1970s, it became apparent that the dam was beginning to silt up, due to soil erosion in the catchment area. Subsequent measures to control livestock grazing in the area were opposed by the livestock owners, who argued that immediate benefits would accrue not to them but only to the participants in the irrigation project. Further proposals for a programme of livestock improvement for the catchment area and the planting of fodder crops, which might make the proposals for grazing control acceptable, have not yet been agreed, even amongst the various Government Departments concerned. Few lessons appear to have been learned from the earlier pilot projects which had shown the need for an integrated programme which could offer linked benefits.

Other Early Pilot Projects

Very little information exists on the other pilot projects of this period. The Mejametalana Improvement Area Project was started in 1959; to be followed at various other dates by the Tsakholo, Tsoaing, Leshoele Irrigation (17), Malibamatso Basin, and Roma Projects. Contemporary reports describe these projects variously as "making good progress" or being "a success", but little technical information is provided in order to evaluate whether these descriptions have any meaning. The style and structure of the annual reports of the Department of Agriculture were such that failure was seldom mentioned and detailed analyses of projects were seldom undertaken. Rather, all mention of a project simply disappears from one annual report to the next, with the inference that these projects had ceased to operate.

Very little was achieved in the last years of British rule. Financial constraints in 1964 resulted in the retrenchment of many extension workers, and much of the stock of equipment was not renewed. Some three-quarters of the total budget of the Department of Agriculture, at this time, was absorbed by salaries [Wallman (1969), p 165].

Perhaps the most striking feature of these projects was the way in which the mistakes and experience of the past were virtually ignored. Little account seems to be have been taken by the "Farmech" Scheme of the experience of cooperative mechanised farming in the first pilot project at Tebe-Tebeng. Again, there appears to have been little cumulative learning from the experience of soil conservation measures

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(17) Reported in 1981 as still operating successfully [TFYDP, p 165].

in the early development programmes. This lack of analysis and critical examination of past failures and attempts at introducing technological change in rural development projects indicates some features about the way in which these schemes were formulated. Apart from the "Farmech" Scheme, the pilot rural development projects were initiated by colonial officials and it is of interest here to examine briefly some of the colonial procedures involved in the design of these projects.

Basutoland's major source of development funding over this period, was the Colonial Development and Welfare Fund from which the British Government allocated money to the Basutoland Colonial Government in successive five-year periods. Technical departments, managed by expatriates, originated proposals in order to compete for a portion of this allocation. The bureaucratic machinery proved extremely cumbersome and approval of projects could take up to eight months. Technical departments seldom consulted with villagers in a proposed rural development scheme, often on the grounds that the money had not yet been secured, the timing was uncertain, and the plans and estimates were, almost certainly, to be modified before being put into operation. Schemes which involved local participation or coordination with other projects were therefore not favoured. The position was further complicated by the fact that there had long been the expectation that Basutoland might eventually be incorporated into South Africa, and the funds allocated for development were accordingly small. For instance, Britain allocated only £1.2 million to Basutoland between 1963 and 1965 [Wallman (1969), p 168].

Given the absence of any means for the coherent and purposeful expression of political will in the country at this time, it is

perhaps not surprising that development consisted of a number of haphazard, rather ill-conceived programmes, unconnected with any national economic development goals. Wallman notes that there was "no real coordination and no statement of priorities that might properly be called a development plan"[Wallman (1969), p 167].

SUMMARY

This brief review of Sesotho rural and agricultural practices, techniques and technical knowledge, and colonial attempts to introduce technological change and improvements to agricultural productivity, has provided an introduction to the context in which modern, post-independence rural development projects are undertaken.

It is clear that the Mosotho farmer is remarkably resilient; he has managed to survive for over a century, with relatively unchanged technologies and agricultural practices, in the face of difficult environmental, economic and political circumstances, and in spite of some fifty years of colonial rural development schemes aimed at inducing technological change. His survival, though, has been a triumph of social organisation, rather than one of technology. Since the adoption of the plough in the mid-nineteenth century, agricultural and rural technologies have remained virtually unaltered. There has been no widespread adoption of new technologies, or of efforts to innovate and improve production practices.

On the other hand, local institutions associated with resource management are well developed. For example, allocations of scarce resources, such as land and building materials, are controlled at the village level, and are based primarily upon need and ability to use

them. These customs, coupled with social organisation and practices of shared work and joint land and animal management, have ensured that the great majority of Basotho households have had access to the means of agricultural production.

Attempts to introduce technological change and rural development have to be undertaken not only within an appreciation of the political, economic and environmental constraints on rural production, but also by giving due consideration to the complexity and importance of the social practices to which these constraints have given rise. It is clear that early rural development programmes did not take into consideration either the economic constraints on agricultural production in Lesotho or the social practices and perceptions which informed Basotho decisions regarding investment and technological change. This disregard of indigenous values, perceptions and knowledge was not purely bureaucratic insensitivity to Basotho aspirations. Rather, it was a direct consequence of an ethnocentric belief that British and European technical and agricultural knowledge was universally applicable. Such knowledge was regarded as "scientific" and, therefore, independent of cultural perceptions and social practice. The appropriateness of this knowledge for the rural environment in Lesotho was not questioned. The design of Colonial programmes, and, indeed, subsequent interventions by aid agencies, to arrest the decline of Sesotho agricultural production has inevitably been affected by expatriate perceptions of Basotho agricultural practices and of the technical improvements necessary for increased agricultural production. Although missionaries in the nineteenth century had observed that:

> "Every part of the country is once more under cultivation....export of grain is taking place by the

> thousand bags...the Basuto are becoming more and more industrious....." [Germond (1967), pp 320, 321],

and remarked on the "agricultural genius of the Basuto" [Germond (1967), p 444], many subsequent Colonial accounts stated that:

> "....the Basuto are not good agriculturalists and do not make the best of their natural resources" [Ashton (1939), p 153].

The influential Pim Report, which resulted in the most extensive programme of soil conservation and agricultural development during colonial rule, echoed these sentiments:

> "Taking the country as a whole, Basutoland has many advantages and if the Basuto were a genuinely agricultural people it provides all the essentials for a substantial degree of prosperity" [Pim (1935), p 5].

and again:

> "Like all other South African tribes they have never been a genuinely agricultural people" [ibid., p 29].

These European views of Basotho farming practices all infer an evaluative comparison. Behind almost all descriptions of Basotho farmers, positive or negative, loom the image of other farmers; perhaps poorer, but most often better farmers. In almost all colonial accounts, the comparative image is unmistakably European.

Some observers may have attempted to be relatively even-handed, and simply recorded Basotho agricultural techniques and customs with minimum evaluation [eg. Sheddick (1954)]. For many others, though, particularly those involved with the technical side of agriculture and improvement schemes, despair at Basotho farming practices and attitudes was based on an image of what constituted "proper" farming practice. The assumption of the Pim report appeared to be that Lesotho was potentially prosperous and could be so if only the people were "genuine" farmers. "Non-genuine" farmers could not be expected to know what is necessary or proper for farm or resource management.

Indigenous technical knowledge and concepts were thus considered valueless and British conservation efforts did little to incorporate native contributions, except as suppliers of labour power under expatriate supervision. The ethnocentricity of Colonial administrators ignored the possibility that there could be a coherent Basotho agricultural knowledge and social practice which could resist and challenge the imposition of foreign technologies which appeared to make little sense, and which could only be regarded as being of secondary importance to Basotho prosperity.

The extensive terracing of lands was one of the proudest achievements of the programme which resulted from the Pim Report; no other rural development programme has since had such an impact upon the landscape of Lesotho. Many of the conservation structures are still in evidence today and most fields are generally laid out along contour lines. It is thus fatuous to argue that all British conservation works were a complete failure. There must have been some dissemination of technical knowledge over the extended period in which these works were undertaken. But Basotho farmers never identified themselves with these schemes, and there was never a significant movement, either at the individual or village level, to adopt all the conservation practices, or maintain or extend the works. The emphasis of the programme was entirely on the mechanical construction of conservation works according to preconceived objectives and designs.

This insensitivity to Sesotho traditional knowledge and agricultural practices, and the inability to communicate with and ensure farmer participation, was also reflected in colonial pilot rural development projects. Although Colonial programmes were influenced by the

prevailing ideologies of community development and agricultural extension, incorporation of these principles of involvement and mobilisation of the local community was restricted, in practice, to rhetoric in project documents.

Community development was a concept which was popular in the 1950s. It was a deliberate reaction to the sectoral rural development approach which paid insufficient attention to local participation and the incorporation of the rural poor in development efforts. It was based on the assumption that the mobilisation and development of community resources, both human and physical, motivated by the multi-purpose village worker, and supplemented with credit and the supply of necessary inputs, would lead to the modernisation of agrarian societies. In practice, over-stretched in its aims, starved of investment resources, oblivious to local practices, community development came to be seen as a combination of welfare services, agricultural extension and construction of small-scale works on a self-help basis. By the mid-1960s it had become apparent that community development had produced few results and the concept began to be abandoned.

The initiation of the first pilot project,Tebe-Tebeng, was a response to the realisation that tree planting and the construction of soil conservation works had been largely unsuccessful because they had been undertaken in isolation from rural productive activities and had not involved rural people. The project was designed to "work with people" and was to be an "experiment in Community Development aimed at progress through the stimulation of local initiative and self-help". Although the project was relatively broad in scope and coupled soil conservation activities with crop and livestock improvement

schemes, and the betterment of village infrastructure, it is clear that the project did not incorporate the noble principles enunciated in its design. The project originated from, and was imposed by, Colonial officials, and technological change was still seen in purely technical terms: mechanisation, the supply of improved inputs, and the direct transfer of European agricultural and technical knowledge. Local participation and involvement in the scheme was not achieved and agricultural extension staff had to resort to policing activities.

Similar ideas of technological change were incorporated in the next large rural development scheme at Taung. Although contemporary reports of the Department of Agriculture noted explicitly that "there has to be a complete union of sociological and technical procedures", there is no evidence that this new approach was adopted. The Taung project was among the first to undertake extensive surveys of the project area, but these were confined to the collection of physical data only. Once again, as in other Colonial rural development projects, there was little attempt to incorporate the knowledge and views of the supposed beneficiaries of these schemes. No socio-economic surveys were undertaken, and there was little on-site experimentation and research on appropriate farming methods.

The overall impact of attempts to introduce technological change, in the Colonial period, was negligible and the comment must be made that there is no evidence of any adoption of technical improvements by rural Basotho as a result of these rural development programmes.

Rural development programmes originated mostly from Colonial officials, and the nature of the technical improvements which were

attempted were affected by ethnocentric assumptions concerning the universal validity of European technical knowledge, by the prevailing ideologies of the period, by the denigration of indigenous knowledge and perceptions, and disregard of the social dimensions of technological change. These themes will be explored in the following chapter which is devoted to an examination of the impact of international aid on post-independence rural development programmes and projects.

CHAPTER FIVE

THE IMPACT OF INTERNATIONAL AID ON POST-INDEPENDENCE RURAL DEVELOPMENT

Following Lesotho's independence from British Colonial rule, in 1966, both the amount of development aid and the number of donor agencies involved in the country have increased dramatically. In 1979, the amount of official development assistance disbursed to Lesotho was, in real terms, more than six times that disbursed in 1970, and it is estimated that more than 70 different agencies have contributed to Lesotho's development budget. The importance of aid to Lesotho's economy is reflected in the fact that net official development assistance amounts to more than 90 per cent of gross domestic investment [World Bank (1981b), pp 164,165; UNDP (1980a)].

Much of this aid has been directed towards the rural sector. There has been the recognition that because the great majority of Basotho live in rural areas, and because agriculture contributes approximately 40 per cent towards GDP, rural development constitutes a key area for development investment. Lesotho's rural development expenditure has been almost wholly financed by international aid agencies, which have played a key role in shaping rural development policy. This chapter seeks to examine, in some detail, the effect of the involvement of international agencies in rural development and programmes of technological change in Lesotho.

These high levels of aid did not occur immediately after independence, however, and it ~~it~~ was some years before the increased levels of development assistance began to have a significant impact on rural development. At the time of the inception of the First Five Year

Development Plan, in 1970, the annual agricultural budget for recurrent expenditure was M1 million and for capital expenditure - M0.6 million [World Bank (1975a), p 42]. These low levels are indicative of the lack of rural development effort before, and immediately after, independence. Capital expenditure on rural development, during this time, was confined to some improvements in existing facilities, and to small pilot development projects in conservation and irrigation. The main effort of the Ministry of Agriculture was in the lowlands and was aimed at slowing down the alarming rate of erosion.

Government annual development expenditure on agriculture in the First Five Year Plan was to increase from M0.6 million to M1.6 million. Over the five year period, M2 million was to be devoted to irrigation projects, M250,000 to crop research, and M0.8 million to the Leribe Pilot Project [SFYDP, p 78]. In the first three years of the Plan, however, no more than M0.7 million a year was spent on the development of agriculture [World Bank (1975a), p 42].

The Lesotho government and donor agencies began to see the disappointingly low level of farmer response to rural development programmes as lying in part in its failure to demonstrate the benefits to farmers in terms of short-term income earning potential. This recognition led government policy makers, in the late 1960s, to seek international aid agency funding for semi-autonomous, area-based crash projects aimed at modernising agriculture and producing visible results within a relatively short period.

LARGE AREA BASED RURAL DEVELOPMENT PROJECTS

Liphiring Integrated Project

One of the first of these projects was the Liphiring Integrated Project, which aimed at increasing rural productivity through improved dryland farming and livestock development. It was situated in the Mohales Hoek District in the same area in which the Taung project had previously been undertaken in the late 1950s. The Western part of the Mohales Hoek district is one of the driest areas in the country and is still severely eroded. A second conservation scheme had been initiated there in 1968-1970 and had concentrated mainly on the construction of conservation terraces and contour banks.

In 1971, Britain gave a grant of M58,000 for a new project, the objectives of which were:

[1] to increase the cash income of the people, with a consequent "enhancement of their prosperity and an enrichment of their lives";

[2] to initiate improved cropping patterns and practices on land suitable for arable farming;

[3] to improve the quality of the livestock of the area and hence to provide a base for intensified livestock production; and

[4] to intensify on-going programmes of soil and water conservation.

The project covered an area of 1130 ha., of which some 400 ha. were arable. An association was formed for participation in the project and was joined initially by 111 of the 220 households in the area.

The lands of member households were amalgamated into two blocks of 240 ha. and 40 ha., thus forming the largest consolidated farming units in the country. The profits from the sale of the agricultural produce were to be shared amongst participants in proportion to their original holdings of land. Livestock improvement proposals included the culling of stock by one third.

The main assumption on which the project was based was that wheat yields could be increased. In the event they declined, resulting in an overall loss for the project. The livestock culling proposal was fiercely resisted, and, consequently, never implemented. Finally, in 1977, the project was terminated when it was recognised that wheat could not be grown profitably in the area, and that local farmers would not agree to the livestock "improvement" scheme.

The failure of yet another project in this same area seems incredible. It appears that people joined the project as a result of the imploring of a charismatic chief of the area and after stern lectures by the then Deputy Prime Minister, who was also from southern Lesotho. But government support was far from adequate. No socio-economic studies of the area were undertaken, there had been little on-site research on wheat varieties, and the design of the project was unrealistic. Even the early optimistic estimates, which included the livestock programme, predicted a net annual return to each family of about M95, an amount which would hardly have met their subsistence needs and could not have created possibilities for prosperity.

Leribe/Khomokhoana Projects

The Leribe Project (known initially as the UNDP Pilot Agricultural

Scheme) began in 1970 as a pilot project. It was the first substantial post-independence rural development scheme undertaken in Lesotho and covered 1000 households and an area of 2000 ha. in the vicinity of Hlotse (Leribe), across the border from the South African town of Ficksburg. A significant proportion of the population of the area migrated daily to work in Ficksburg. The nearness of this town, with its attendant labour opportunities, markets, and sources of supplies, coupled with relatively fertile soils, a low incidence of soil erosion, and reasonably good road communications, did not exactly provide a typical area for the siting of a pilot scheme for the lowlands.

The Leribe Project was designed to demonstrate the impact on production and income of an integrated approach to agricultural development within the existing system of land tenure. It concentrated on the application of relatively simple packages of inputs, including mechanisation, improved seed, insecticides, fertiliser, and extension services. It was also designed to test the acceptability and effectiveness of semi-cooperative farmer organisations. There were training programmes for agricultural staff, and soil conservation works were undertaken.

The UNDP contributed $1.48 million to the project, over a five year period, and the Government of Lesotho's contribution was $602,000. In the project area yields of traditional crops doubled, as did cash incomes, although, in individual terms, this amounted to an increase from only M20 to M40 a year. An initial evaluation concluded that the project demonstrated that farmers are responsive to improved agricultural techniques [World Bank (1975a), p 43].

The scheme was phased out, in 1975, when some aspects were incorporated into a much larger agricultural project in the adjacent Khomokhoana catchment area, encompassing 19,000 ha. of which 13,000 ha. were cultivated. The enlarged scheme, known as the Khomokhoana Rural Development Project, was financed by the Government of Sweden (SIDA), through the FAO, with a grant of $2.8 million. In addition, the government of Lesotho also contributed M1.45 million, over a five year period from April 1975. Much of SIDA's contribution was expended on expatriate salaries. Although the project director was a Mosotho, a high proportion of project staff were expatriates, including the extension officer, farm mechanisation specialist, soil conservationist, soil conservation engineer, animal production officer, marketing and credit officer, production economist, field agronomist, administrative officer, and special consultants.

The goal of the project was the intensification of crop and livestock production, and was to be achieved through improved systems of credit, input, and marketing facilities, integration of conservation works with agricultural production, and involvement of farmers [SFYDP, p 85].

Although the Khomokhoana Project grew out of a pilot scheme, its goals, nevertheless, were overambitious. Yield increases in the demonstration plots were impressive but were less so on farmers' fields in the project area. Dissemination of knowledge was ranked high as a project objective but met with only limited success. According to project personnel, this was mainly due to the lack of effectiveness of extension staff. Lack of capital, of technical and management skills, and of suitable equipment were listed as major constraints. Risk of financial loss, lack of formal production

incentives, and an attitude that agriculture is only a supplementary income source, were noted as constraints on farmers' acceptance of the development programmes.

A number of the project's activities were dependent on the efficient operation of sophisticated machinery. The project staff reported that:

> "Unfortunately, most of the Project's activities depend on the availability of the correct equipment, working at the correct time and properly supervised. In many cases the lack of staff has made this impossible.....An example of this problem is that 112 working days, were lost during the six month period by the Project's two bulldozers while they awaited repairs" [FAO/SIDA (1977), p 2].

It was also noted that the project's two combine harvesters, used for harvesting wheat, broke down a number of times. Project staff ascribed this to the high proportion of time spent manoeuvring in small fields and travelling over rough access tracks.

The project made good progress in integrating crop and livestock efforts with conservation activities. Less progress was made on integrating project activities with the long-term activities of the Ministry of Agriculture, with the consequence that many of the lessons learned, and much of the knowledge gained, were lost on the departure of project staff. Nevertheless, the government later claimed that:

> "A substantial amount of information has been gained which has been utilised in the formulation and implementation of the Thaba-Bosiu and Senqu Projects which started later in the [First Five Year Development] Plan period" [SFYDP, p 8].

The Khomokhoana project was terminated in mid-1980, at the end of the planned funding period.

Senqu River Agricultural Extension Project

Soon after the commencement of the Leribe Pilot Project, an agricultural extension project was initiated in one of the poorest parts of the country - the Senqu River valley, in September 1972. The project was to promote agricultural development, through strengthening the extension effort, in the two southern districts of Mohales Hoek and Quthing.

The project area is divided into four distinct ecological zones: the Senqu River valley (35%), lowlands (10%), foothills (5%), and mountain region (50%). Arable land is limited to about 10 per cent of the project area. The population of the two districts was estimated as 219,000. Seven areas which showed particular potential for improvement were selected initially for special attention. Data gathering and planning were designed to prepare the agricultural sector in this entire region for a large scale comprehensive rural development programme. Extension efforts were to concentrate on consolidated dryland farming, irrigation, livestock production, range management, and conservation.

The project began soon after the ending of the preparatory phase in April 1974. The UNDP contributed $ 219,500 and the Government of Lesotho M49,000 for the preparatory phase of the project. During phase I, the UNDP contributed a further $1.54 million and the Government of Lesotho M215,700. A large proportion (48%) of the UNDP's contribution was absorbed by the salaries of expatriate personnel, who filled the positions of project manager, agronomist, watershed management officer, animal production officer, extension/training officer, range management officer, farm management economist, crop

production officer, rural sociologist, administrator, credit marketing officer, surveyor, and mechanic [Nobe and Seckler (1979), p 107].

The project absorbed almost the entire staff of the Agricultural Extension Service of the Mohales Hoek and Quthing Districts. A senior District Extension Officer was assigned as project co-manager. On paper, the project was responsible to the Permanent Secretary of the Ministry of Agriculture in his capacity as chairman of the Project Coordinating Committee, which comprised the Permanent Secretaries of the Ministries of Interior, Works, Education, and Health, the Directors of Central Planning and the Bureau of Statistics, the District Chiefs, farmers' representatives, and UNDP and FAO personnel. In practice, the committee met only once. Of more value were the monthly meetings of the District Coordinating Committee, which involved all the senior district staff of the various ministries, and the project staff.

The long term objectives of the Senqu River Agricultural Extension Project were to assist the Government of Lesotho in meeting its national aim of raising agricultural production above subsistence levels, and to promote cash cropping. To achieve these targets it was believed necessary to:

[1] identify the constraints to rural development in the project area;

[2] determine and demonstrate the economic feasibility of overcoming these constraints; and

[3] strengthen the Government services to carry out development activities [Senqu River Agricultural Extension Project (1978), p 2].

The immediate objectives of the project were to:

[1] expand the application of sound animal production practices through improved feeding, breeding and management;

[2] expand the application of sound crop production;

[3] demonstrate economic methods of irrigation, and fodder production;

[4] expand conservation works and practices;

[5] provide short- and medium-term credit;

[6] leave behind a well-trained cadre of national staff; and

[7] assist Government in the formulation of a comprehensive rural development plan for the entire project area [Senqu River Agricultural Extension Project (1977a), pp 2,3].

In April 1976, a UNDP/FAO Project Formulation Mission completed a Phase II Project design and forwarded it to the UNDP for approval and funding under the UNDP/Government of Lesotho Country Programme. It seemed as though the next phase of the project would proceed [SFYDP, p 85], but this funding was not approved, and the Senqu River Agricultural Extension Project was terminated in August 1976. Most of the experienced staff were lost, but a small contingent stayed on under the Ministry of Agriculture in an effort to integrate the ongoing activities with the planned Basic Agricultural Services Programme

(BASP). By late 1977, most of the machinery and equipment had been reallocated to BASP and the last of the FAO expatriates were preparing to leave.

Many of the activities of the project were, in effect, failures. One survey noted that:

> "Consolidated blocks rarely produced high yields, were not received favourably by the farmers, lost money in almost all cases, and were finally closed down" [Senqu River Agricultural Extension Project (1978), p 2].

Another survey remarked that a

> "....common response of farmers when asked about the Senqu Project is to say they know nothing about it" [Senqu River Agricultural Extension Project (1977a), p 32].

In 1978, it was reported that irrigation equipment worth M50,000 was lying unused in the project area [Nobe and Seckler (1979), p 113].

One of the more worthwhile aspects of the project was the number of detailed socio-economic surveys of rural households and attitudes towards farming which were undertaken. Unfortunately, by the time these had been produced, the project was already being phased out. A "Socio-Economic Technical Report" undertaken by the Project, suggests that the constraints to agricultural development are as much social as they are economic:

> ".....the philosophy behind this study is that, in order to design a project which is socially and economically feasible and sustainable, and in which the rural farmers would have sufficient confidence to carry out the work on their own initiative, it is necessary to have a deep and careful knowledge of the farmers' attitudes, practices and problems, and to involve the farmers at all stages of the local planning and implementation process" [Senqu River Agricultural Extension Project (1978), p 2].

The survey of farming practices revealed that only one third of the farmers used any recommended practices and that very few used all of them. This situation was possibly worse than if they had used none

at all, as often the successful use of one practice requires the use of others. Thus resources were wasted without achieving significantly improved production.

The survey also found that farmers know that they have problems with crop production, but are not optimistic about solving them. The major problems are perceived to be cutworms, drought, animals eating their crops, erosion, poor farming, lack of supplies, theft, late ploughing and weeds. They knew that the solutions to these problems, require insecticide, better farming, rain, fencing, tractors, terracing, irrigation, and grazing control for animals. These solutions either require money or labour or good weather, none of which is available in abundance. Only one half of the farmers interviewed for the survey believed that their needs were being satisfied from their fields, and many recognised that their yields were low. Only a quarter of these farmers thought that their fields were improving, while 40 per cent thought that good rains were what was needed. More farmers were prepared to wait for nature to help them than to respond to the new technologies being introduced by project officers. The constraints on rural development were further compounded by the lack of understanding by project personnel of these farmer perceptions [Senqu River Agricultural Extension Project (1978), p 8]. The survey stated further that:

> "At the same time that the farmers on the consolidated blocks did little and produced less in their fields within the blocks, there were individual farmers in the Senqu Project area who, unknown to the Project.....were obtaining good yields, earning modest sums through sales of their surplus, and demonstrated good farming practices to their neighbours" [Senqu River Agricultural Extension Project (1978), p 1].

These better (and wealthier) farming households differed in many ways from the ordinary households. They had more family members, in

particular, more males at home. They had more fields and implements, they tended to use the recognised improved agricultural practices, and their yields were higher. This group of farmers were also more likely to encourage their sons to work on the farm, rather than to migrate to the mines of South Africa.

The Senqu Project aimed to identify and overcome the constraints to rural development. The report argues that their surveys demonstrated that these constraints were already being overcome by the better farmers. They had the resources, the motivation and the knowledge which the ordinary farmers lacked, and as a result they used adequate farming practices, and managed to produce enough for home consumption as well as a surplus for sale. In contrast, the Senqu River Project made net losses in such activities as farming the consolidated blocks.

The survey suggested that in order to meet the third objective of the project, namely the strengthening of services to carry out development objectives, it was necessary to study the motivation and methods of the better farmers and find ways to transfer their motivation and methods to the ordinary farmers.

What the survey does not mention, is that these "better" farmers were obviously wealthier and had access to resources which poorer farmers lacked. Clearly, any programme aimed at poorer farmers would need to take into account the problems of access to resources.

The project, however, never had the opportunity to act on these findings, or to base their programmes for the ordinary farmer on these considerations. In many respects the 52 months of the project can be viewed as an experiment - but one which was never expanded into a

programme of technological change which might have allowed the possibility of improved economic development of the area.

Thaba Bosiu Rural Development Project

The Thaba Bosiu Rural Development Project was designed after a visit by teams from the International Development Association (IDA) and USAID, in March, 1972. It was the first USAID/World Bank joint agricultural development project in Lesotho, and if successful, was to be replicated in the rest of the country.

The Thaba Bosiu Rural Development Project began in 1973 after the negotiation of credit of $5.6 million from the IDA, and receipt of a grant of $3.3 million from the USAID. It was planned to run for six years, to March 1979, and it was estimated that the total project cost would be approximately $12 million, with the UNCDF contributing $185,000 and the Government of Lesotho approximately $3 million. The IDA loan was to be repaid in semi-annual installments commencing in 1983, ten years after signing the agreement. Interest repayments were to be one percent per annum for the principal amount for the first ten years (1983-1993), and at three percent of the principal amount for the next thirty years [Nobe and Seckler (1979), p 86].

The Project had the goal of improving the livelihood of 17,500 rural households in a 121,000 ha. area in the lowlands and foothills not far from the capital, Maseru.

The project's objectives were:

[1] to provide a more assured subsistence and to increase the income derived from crop and livestock production;

[2] to control erosion and transform land use patterns to permit the introduction of a permanent system of integrated farming combining rotational cropping with improved livestock production; and

[3] to provide data for the preparation of similar rural development projects in other areas [Thaba Bosiu Rural Development Project (1975), p 1].

The project's activities were classified as "simple", "complex", or "special".

> "The Project does not offer ready-made solutions based on pre-conceived ideas but endeavours rather to provide appropriate services to meet farmers' stated needs (simple activities). Where farmers are not sure what they do need and previous services have been only partially successful (e.g. soil conservation, commercial milk production and the introduction of a sound permanent farming system) great care is taken to assess realistically the resources available, obtain a clear picture of the socio-economic scene and, through continuous dialogue with the community concerned, modify the preliminary technical solution until it is realistic, appropriate and accepted (complex activities)" [Thaba Bosiu Rural Development Project (1975), p 1].

Simple activities were in response to calls from farming households for the timely supply of farm inputs for the four main crops: maize, sorghum, beans and wheat. It was considered that there were no social constraints on the adoption by individual farmers of the inputs and of the improved methods of using them. The simple activities consisted of three interdependent elements:

[1] a supplies and marketing system to put the inputs within reach of the farmers at the right time;

[2] the spot repair and maintenance of tracks and roads to permit the inputs to reach the distribution points; and

[3] demonstration of the value of the inputs, instruction in improved use of the inputs, and the repair, and instruction in the use, of farm implements.

Complex activities consisted of the introduction of new land use patterns to entire communities, which would enable farmers to follow improved soil conservation and livestock husbandry methods and develop sound integrated farming systems. The following elements were to be included:

[1] soil surveys and land use classification;

[2] revised land use plans incorporating fodder production in conservation programmes;

[3] the installation of a complete system of conservation measures; and

[4] instruction of the whole community in conservation and animal and crop husbandry.

Special activities included such projects as the limited introduction of asparagus as a high value cash crop and the setting up of an asparagus cannery.

Some 70 village distribution points (VDPs), supplied through 7 project operated stores, were set up. Demonstration plots were established at many of the VDPs, and various other extension activities, such as short courses for farmers, lipitso , and field days were organised. Agricultural research was also undertaken. A mobile repair service was initiated, as well as a credit scheme. Some 74 km of access roads were constructed in order to facilitate the supply of

farm inputs, and the marketing of produce. A soil conservation scheme was begun which included: aerial surveys and mapping; a soil survey; land use and conservation planning; dialogue with the community; and, finally, the construction of conservation works. An internal project report claimed that:

> "Many meetings were held with the community at large and also with an advisory committee elected by the people. The conservation plan was thoroughly studied, discussed and modified in detail until understood and accepted by the community" [Thaba Bosiu Rural Development Project (1975), p 13].

All divisions of the project, with the exception of the extension division, were controlled and managed by expatriates, who filled the following positions: project manager; senior economist; economist; anthropologist; senior agronomist and two assistant agronomists; personal secretary to the project manager; clerical supervisor; chief finance officer; chief conservation and roads officer; conservation engineer; conservation and land planning officer; conservation layout officer; workshop manager; equipment officer; chief development and training officer; and agricultural machinery officer.

After only two years' operation the staff were so confident of the success of the overall project that they recommended that a second phase be funded for the period 1977 to 1981, which would expand the simple activities of the project throughout the lowland and foothills, and which would continue the more complex activities within a Thaba Bosiu Phase II Project. However, internal project reports at the time stated:

> "The Project does not yet know if yields and income have been raised by Project activities....farmers themselves [however] have been quick to take advantage of Project facilities. Virtually without credit they have increased their consumption of fertiliser by 33%....." [Thaba Bosiu Rural Development Project (1975), p 28].

The project had achieved its aim of increasing the supply and availability of inputs, but there was nevertheless little evidence to demonstrate that yields, and more important, incomes had risen. The farmers had thus probably incurred losses and were almost certainly worse off. Furthermore, reports at the time mentioned that:

> "There were serious communication failures, where activities were performed but farmers were simply not made aware of them. For example, the availability of credit was not known to many farmers; leaflets were not distributed well enough and too few farmers listened to broadcasts; comparatively few farmers were reached through field days.
>
> Many Project activities were poorly executed. For example, some demonstration plots were failures, supervision and performance of VDP agents was uneven, there were labour management problems in conservation works, some research trials were lost and there were delays in the production of socio-economic studies" [ibid., p 29].

One constraint which was mentioned was the shortage of qualified local and foreign staff. Even by the the end of the second year of operation, the most crucial section of the programme - extension work - was only half staffed.

A decision was initially taken by the Government of Lesotho to supersede the Thaba Bosiu Rural Development Project by creating two further projects [SFYDP, p 84]. A Basic Agricultural Services Project (BASP) would expand the simple activities of the Thaba Bosiu Project throughout the lowlands by building a national farm supplies and marketing network at village level with coordinated provision for extension, credit and road building. Later, a Thaba Bosiu II Project would continue the complex activities associated with conservation, livestock, integrated farming, asparagus and other high value crops within the original Thaba Bosiu I boundaries.

In the event, BASP took much longer to activate than had originally

been envisaged and the decision to proceed with Thaba Bosiu II was revoked. Activities dependent on the IDA loan were terminated in October 1977, when these funds were exhausted. Those activities dependent on USAID funds (mainly conservation works) continued until March 1979. The asparagus project and cannery have continued to operate.

A substantial overall evaluation of the Thaba Bosiu Rural Development Project was never undertaken. The above analysis has indicated that little progress was achieved in increasing crop yields and outputs, on which most of the original project justification was based. One research paper has noted that some progress was made in "disseminating technical knowledge, including development of basic research data" [Nobe and Seckler (1979), p 101], but little evidence is supplied in support of this contention. Enormous sums of money were spent with apparently very little to show for it. It has been calculated that the cost of the conservation measures amounted to nearly £185 per ha. (M146 per acre) [Nobe and Seckler (1979), p 101]. Such an investment seems disproportionately high when it is remembered that nearly 30 years previously, following the conservation programme initiated as a result of the Pim Report, farmers were unwilling to protect government investments of only £1.50 per ha. [Quirrion (1958), p 125].

Project and aid agency staff have argued that one of the major successes of the project was the degree of institutional innovation it achieved, through the creation of an autonomous administrative authority for the project, and which enabled far greater efficiency in management and execution of activities. The project could circumvent many of the government bureaucratic delays, inter-departmental

conflicts and lack of coordination. It was planned that, on the completion of the project, the administrative and infrastructural components of the project would be absorbed by the BASP programme within the Ministry of Agriculture. But, by 1979, a donor had still not been found for this block of the programme, and much of the administrative structure had disappeared. Trained staff moved elsewhere, thus eliminating much of the hard work and experience of the previous four years.

Indeed, the anomaly of an autonomous project authority, with a high concentration of expatriate staff, and with the ability to recruit some of the best qualified Basotho into highly paid jobs, was not sustainable, and was bound to collapse once the donor funding was exhausted. A fair amount of antagonism developed between the government and the project management over its employment practices, which often involved hiring opposition (BCP) supporters contrary to government policy. The government was determined that the project would not be seen as a "BCP Project" and this was one factor amongst those which contributed to the decision not to extend the project in 1977.

COUNTRY-WIDE RURAL DEVELOPMENT PROGRAMMES

Basic Agricultural Services Programme (BASP)

The strategy of agricultural development in the mid-1970s was centred on the three area-based projects just reviewed - namely, Khomokhoana, Senqu and Thaba Bosiu. It was realised subsequently that this approach had several distinct drawbacks. The area-based projects, with a high degree of expatriate support and substantial resources,

operated in a largely autonomous manner without adequate coordination with government programmes. It was decided subsequently to absorb these projects into the planning and administrative structure of the Ministry of Agriculture; and to pursue programmes with a wider and more diffuse impact. It was within this context that BASP was conceived and planned, with the assistance of the World Bank's Regional Mission in East Africa, in 1976 and 1977.

BASP was intended to operate throughout the lowlands and foothills of Lesotho, covering an area of some 295,000 ha. of arable land. It was based on the experience and achievements of the principal area-based rural development projects of the early and mid-1970s. The programme was to involve the development of physical infrastructure such as roads and stores, the provision of inputs, credit, extension and output marketing facilities. The programme also aimed to strengthen the capacity of the Ministry of Agriculture to plan, implement and evaluate projects, and included a substantial training component. In contrast to the major area-based projects, BASP attempted to induce a gradual, incremental improvement to farming practices and yields, but as the programme aimed to include most of Lesotho's farmers, the envisaged national increase in agricultural production was to be substantial.

An underlying assumption in the design of BASP was that Basotho farmers respond rationally to their options and constraints. The design of the programme recognised the marginal contribution of income from agriculture to the average rural household's total income, the "pull factor" of labour opportunities in South Africa, the high risk of a crop failure, and that land is thus perceived by rural households chiefly as a source of security, rather than as a source of income

[SFYDP, p 86]. The project's objectives imply, though, that it is still necessary to support the domestic agricultural sector and render it more productive where possible.

The estimated cost, in May 1978, for the 1977-1981 period was M23 million ($26.4 million), and the foreign exchange component was estimated at $15.2 million (58%). Programme costs were originally to be financed by: the World Bank/IDA - $6 million; Federal Republic of Germany - $4.7 million; the U.K. - $3.9 million; the European Development Fund - $3.9 million; the UNDP - $0.02 million; the Government of Lesotho - $7.7 million, and the farmers' own contribution - $1.1 million. Of the IDA contribution, $3.8 million was to go to the foreign exchange cost of internationally recruited staff; $500,000 towards the foreign exchange costs for vehicles and equipment; $900,000 for the costs of civil works; and the remaining $800,000 for operating expenses including local salaries and wages. The economic rate of return for the project, calculated over 25 years, was estimated at 13 per cent [Guma (n.d.), p 2]. BASP has a staff of approximately 720, including 29 internationally recruited aid personnel. The project was designed to bring benefits to approximately 128,000 households, either directly through increased input supplies, credit and extension services, or indirectly through the improved infrastructure.

Initially, there was some disagreement between the World Bank and the government of Lesotho; the former preferred component funding, but the latter, with the backing of individual donors, preferred, and ultimately obtained, block funding (i.e. donors would fund complete programmes in particular areas, rather than particular functions within BASP). Six areas were to be established, each with their own

management and central office. A BASP Division was established at the Ministry of Agriculture. Its purpose was to strengthen the mangement capability of the Ministry, and to coordinate and supervise the implementation of BASP.

The programme took much longer to get started than was originally anticipated. This was partly due to additional demands on scarce skilled staff for the formulation and reconciliation of the different objectives of the winter wheat cultivation programme.

A strong monitoring and evaluation component was built into the programme:

> "1. To survey and diagnostically analyse what is going on in any given development area both in respect to sociologic attitude and economic reality.
>
> 2. To find out some hitherto scientifically unrecognised local technologies in order to appreciate the indigenous practices and study their applicability as appropriate technologies vis-a-vis the modern technologies.
>
> 3. To apply the results of such study in formulating applicable policies and designing practical strategies which, upon implementation of the relevant project/programme, should ensure reasonable success in solving the area's socio-economic problems.
>
> 4. To use the resulting baseline data as benchmark against which the effects, impacts, implications and validity of the implemented project is measured" (1).

Extensive base-line socio-economic surveys were completed and computer processed. This included data on labour, land, farm resources, related agronomic and ecological factors, and farmer attitudes.

BASP is still operating, but it is too early to assess its

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(1) Guma (n.d.), p4. Grammar, spelling, punctuation and numbering anomalies in this, and other quotes in this case study, have not been corrected or altered from the original documents.

performance or effectiveness.

Winter Wheat Programme / Cooperative Crop Production Programme

In 1976, the Ministry of Agriculture undertook to share-crop large areas of arable land in the lowlands for the growing of winter wheat in a mechanised farming operation. Based on the traditional concept of share-cropping, but with the government and farmers as partners, it was hoped that the project would raise Lesotho's agricultural output by exploiting the large proportion of land which lies fallow in winter. There was also the desire within high levels of government to demonstrate improvements in Lesotho's agricultural output on the occasion of the country's tenth anniversary of independence.

The result was the ambitious Winter Wheat Programme, which severely stretched the resources of the Ministry of Agriculture. The government supported all expenses, including seed, ploughing, planting, discing, harrowing, fertiliser, and combine harvesting. After harvest, the farmer was to pay the government M30 per hectare, either in cash or in wheat, according to its official price. The harvest was then to be divided equally between government and land-holders. The government also undertook to buy the farmers' share at a fixed rate. Land-holders were to be responsible for weeding, threshing, and other non-mechanised operations. The scheme was to be restricted to four areas along the western edge of the country; Peka, Mafeteng, Khubetsoana, and Rakolo. South African farmers were to be involved, as contractors, for the various mechanised operations.

Basotho farmers responded enthusiastically to this opportunity. The project design intended that 12,000 ha. would be planted, but only

3100 ha. were finally involved in the scheme. A shortage of competent staff to manage the project meant that contractors were overpaid, excessive fertiliser was used, and seeding rates were exceeded. There was also the problem of storage for the harvested grain. The government reportedly sustained losses of between M300,000 and M360,000.

The programme was later renamed the Cooperative Crop Production Programme (CCPP). It has been claimed that yields finally proved to be 40 to 50 per cent higher than the national average [TFYDP, p 167]. On the government's own admission, though, the programme still had serious drawbacks. Chief of these was the huge financial losses the government was incurring. The programme was modified to provide for cost sharing between the government and the farmers, except for the ploughing costs, which were to be contributed by the government as a subsidy. Even this refinement was not sufficient to prevent the project from incurring further substantial losses.

Consequently in mid-1979, following much criticism from donor agencies, it was decided to reassess the programme, and explore other approaches for accelerating yield increases and production.

SMALL AREA-BASED INTEGRATED RURAL DEVELOPMENT PROJECTS

Sections within the government have recognised that it has "neither the capacity nor the knowledge to implement a nationwide programme" of rural development [TFYDP, p 136]. It has thus persisted with small area-based experimental projects. The following projects are expected to run until the end of the Third Plan period, by which time they will have been phased out as independent activities. Little

information exists on these projects and no evaluations are known to have been made. The following section summarises briefly the main objectives of these projects and their source of funding (2).

Thabana Morena Integrated Rural Development Project

This project was planned at the end of the Second Plan period following a visit of a UN mission on rural development in Lesotho. It was to be an integrated development programme in the Mafeteng District which encompassed approximately 60,000 people, and was to be based on the "expressed needs of the villagers" [UNDP (1978b), p 8].

The design phase was funded by the UNDP and was executed by the FAO, which provided two "experts" and five local staff. The project team was to:

[1] undertake an intensive study of a variety of sociological and economic factors in the area;

[2] investigate and develop the best methods of motivating the people to participate in activities which they determine are

(2) At least four recent small rural development projects are known to exist in the country other than those reviewed here: namely, Mafotholeng, Hololo Valley, Mphaki, and Siloe. The first is a small-scale project situated in the Berea District and has demonstrated the possibilities of using local resources for rural development [TFYDP, p 137]; the second is an Irish funded project situated in the lowlands and incorporates irrigation technologies. The Mphaki project was formulated in 1977; it covers a mountain area of 72,000 ha. in the Quthing District, incorporating approximately 25,000 large livestock units. The Siloe Rural Development Project is located close to the Thabana-Morena area and is chiefly involved in the construction of water supplies. It is expected that the project will gradually integrate other development activities which have been requested, such as conservation, livestock, and craft development. Further discussion here is not warranted on account of the small sizes of these projects and the paucity of information available on their objectives and activities.

needed;

[3] implement the assistance project on a small scale; and

[4] design a more comprehensive project.

The budget for the design phase is shown below in Table 5.1.

Item	Cost $
1. 2 experts for 1 year	96,000
2. 9 man-months short term consultancies	35,000
3. Salaries for local staff	15,000
4. 1 vehicle	6,000
5. 3 horses and equipment	1,000
6. Operating costs	20,000
TOTAL	$173,000

TABLE 5.1 : Design Costs for Thabana Morena Integrated Rural Development Project
Source: FAO (n.d.). "Integrated Rural Development Project in the Kingdom of Lesotho", mimeo, p 8.

The Government of the Netherlands approved a further $1 million for the execution of the project. It has been claimed that project components are being determined "entirely by what the communities want" [TFYDP, p 137]. These have included a feeder road, constructed on a voluntary basis, a fishpond,latrine construction, and vegetable gardens.

Rankakala Development Project

The Rankakala Development Project was established in 1977 to provide rural education and development services to a remote area in the

Quacha's Nek district. Encompassing 28 villages, with a total population of about 10,000 , the project sought to utilise an integrated approach to rural development. It included family planning, nutrition, child care, food production, the construction of a health centre and the creation of employment opportunities.

The project was to run from September 1977 to October 1980. A project authority was established which included the senior district officers of the relevant ministries, and operated under the chairmanship of the District Administrator. An elected committee of villagers, with the project manager acting as the organising secretary, was responsible for the implementation of the project.

The project aimed:

> "a) to establish a health centre to decrease the incidence of maternal and child mortality and morbidity,
>
> b) to establish a health centre where 150 village midwives, 300 women (nutrition and home economics), 160 farmers and 24 women (knitting) shall be trained over the plan period,
>
> c) to assist technically the community to produce excess crops for marketing, and
>
> d) after 1980, to use this centre for the training of family planning fieldworkers, nutrition and agriculture extension workers and health workers" [Lesotho Distance Teaching Centre (1978), p 7].

Ha Makoae Rural Development Project

This project has been implemented by the non-governmental aid organisation, Plenty International (3), and provides a marked contrast with

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(3) Plenty was established in Canada in 1976 as a "grass-roots international development agency. Its aim is to work amongst the poorest people, sharing the world's resources through equitable and appropriate means, and working towards village self-

other rural development projects in Lesotho. The project began in a modest way in 1979, with two Plenty volunteers living in the village of Ha Sempe near Sebapala in the Quthing District. The first year was spent learning the language and customs of the villagers and helping to start modest development projects, such as an irrigated vegetable garden, a fruit orchard, and tree planting. The Plenty organisation has described its work in the following terms:

> "The existence of this project has demonstrated that simple technologies like gravity-fed irrigation, fencing, quality seeds, hand tools, instruction of intensive vegetable gardening techniques and committee organisation can create a sufficient supply of fresh vegetables where little previously existed" [Plenty Lesotho (1980a), p 4].

Following discussions with the Ministry of Cooperatives and Rural Development, a site near Ha Makoae was allocated to Plenty to build and operate a village technology centre. Initial discussions with the surrounding villagers revealed that one of the urgent needs was for a foot bridge across the Quthing River, and this was the first project undertaken by the Plenty team. A number of rondavels (traditional round huts) for staff housing were built using local stone and thatch, and employing local artisans. Other activities included soybean cooking demonstrations, tree planting, horticulture and village water supplies. During this time it became clear that the continuous and close interaction between the Plenty development team and the Basotho was a significant factor in the successful implementation of projects.

Funding was initially modest, with $26,925 being supplied by CIDA in 1979. The increased funding in 1980 is shown in Table 5.2 below.

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sufficiency" [Plenty Lesotho (1980a), p 4]. Funded mainly by UNICEF and CIDA, projects have also been undertaken in Guatemala, Haiti, San Diego and South Bronx. Plenty evolved from the Farm Community in Tennessee founded by Steve Gaskin.

Funding Agency	Canadian $
CIDA	30,000
Plenty Canada	10,400
Plenty USA	6,000
Irish Government	6,750
Lesotho Government	9,750
Catholic Relief Service	900
TOTAL	63,800

TABLE 5.2 : Ha Mokoae Rural Development Project Funding (1980)
Source: Plenty Lesotho (1980a), p 11.

It was planned to increase the scope and expenditure of the project further in 1981, with a planned budget of (Canadian) $139,000. Planned projects included communal vegetable gardens, greenhouses, further expansion of the village technology centre, photo-voltaic powered lighting systems, a micro-hydroelectric scheme, a village technology workshop, a solar soy dairy, fruit orchards, afforestation, composting latrines, and extension programmes.

THABA TSEKA RURAL DEVELOPMENT PROJECT

The largest and most extensive rural development project undertaken to date in Lesotho has been the Thaba Tseka project. The project duration, from the planning stage through to the end of the final phase, is ten years and rural development activities have encompassed an entire district, or approximately 10 per cent of the country. The greater portion of the field work of the writer was undertaken at Thaba Tseka and the evolution of the project will be examined in some detail in order to determine the nature of the impact of interna-

tional aid on rural development and programmes of technological change.

Prior to the commencement of development efforts at Thaba Tseka (4), public investment had been almost exclusively concentrated in the lowlands of Lesotho. Approximately one quarter of the nation's population resides in the neglected mountain region, which constitutes three-quarters of the country's total area, and nearly all of its rangeland. Communications were difficult, there was a lack of all weather roads, and settlements are widely dispersed over a rugged topography. The government finally recognised that the mountain people had been the least affected by the increased development efforts after independence (5), and that overgrazing and soil erosion were accelerating. It was decided to embark on a complex and large programme which would bring the necessary services to the mountain residents, and which would attempt to create the necessary conditions to improve their material well being.

Thaba Tseka Mountain Development Project (Phase I)

A FAO/World Bank mission, in which the Canadian International Development Agency (CIDA) also participated, visited Lesotho in November and December 1974, with terms of reference to prepare a first phase mountain area development project which would be suitable for financing by IDA and CIDA. The FAO/World Bank proposal stated

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(4) Thaba Tseka translates as "mountain with a white blaze" so named after the white marks left on the south-facing cliffs by a vulture colony. Tseka translates as white blaze on a horse's forehead.

(5) The average household income in 1974 in the mountain region was estimated as M45 from crop production, and M105 from livestock [FAO (1975), p 6].

that the project:

> "....would comprise a series of developments which together would form an integrated minimum package for the implementation of the first phase and for the formulation of a wider second phase. The project would have components covering road construction, rangeland and crop development, improvements of living conditions in villages and a Regional Centre to implement phase one activities. Given the lack of local experience in rangeland improvement, one of the project's key objectives would be to evolve and assess rangeland development and utilisation methods suitable for wider application later" [FAO (1975), p i].

The project area consisted of 46,000 ha., mostly in the eastern region of the Maseru District, but with a portion stretching into the Leribe District. The area covered 1500 households, with a total population of approximately 9,000.

Thaba Tseka had been selected by the Government of Lesotho as a suitable base for the proposed development of the mountain region chiefly because of its central location. Prior to the commencement of the project, very little infrastructure existed in the Thaba Tseka area apart from a nearby mission, secondary school, mission hospital, a woolshed, two trading stores, a credit union, a food aid store, livestock shed, and rudimentary housing for police, water survey technicians, and a livestock officer. Residents in the area lived in small scattered villages in traditional stone and thatch dwellings. (6). Access to Thaba Tseka was either by air (landing on an inclined

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(6) Man is no recent arrival in the mountain valleys of the Thaba Tseka District. Archeological investigations have yielded dates for Middle Stone Age deposits going back more than 43,000 years. Later hunters left a record of aspects of their life in the rock paintings still to be found in sandstone shelters. Most paintings now clearly visible probably date from the past 500 years. However, painting at Sehonghong was clearly taking place before A.D. 450. The San, who were the artists, lived a hunter gatherer existence, which became threatened in the nineteenth century as white settlers began to reduce the wild animal population with guns. The San were unacquainted with agriculture and as their source of livelihood disappeared, they began increasingly to raid the cattle of the Basotho to the West and of the white farmers of Natal to the East. Punitive expeditions were organised by both

grass strip), by four wheel drive vehicle over a rough track, or on horse-back over bridle paths. The 180 km journey from Maseru to Thaba Tseka by vehicle could take a full day, and breakdowns or adverse weather conditions frequently delayed such trips indefinitely.

The project's main investment was to be the establishment of a regional centre at Thaba Tseka and a road link with the capital Maseru. Other aspects of the project were to include the improvement of feeder roads within the project area in order to facilitate the supply of inputs and the marketing of farm produce, and livestock and crop production improvement schemes.

Livestock development was to include better grazing management and experimentation with methods for improving rangeland. For crop production the main emphasis was to be on better land preparation and the supply of inputs along the lines introduced by the Thaba Bosiu project. A "lead farmer" approach was to be adopted with the objective of reaching 5 per cent of the farmers in the first year. Farmer participation was to reach an estimated 60 per cent after 6 years. It was envisaged that crop yields would increase from 500 kg/ha to 1100 kg/ha for maize, from 550 to 1400 kg/ha for wheat and from 350 to 750 kg/ha for peas [FAO (1975), p 16].

The project was also to provide piped water to about 8000 people in 16 village areas, using gravity feed systems from nearby springs.

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sides, and the last organised band of San, under the chief Soai, was destroyed in 1871.
The shortage of land in the lowlands led to increased use of the Maluti as pasture in the summer months. Subsequent to the Gun War of 1880/1 refugees began to resettle in the mountain region. The first permanent villages in the Thaba Tseka District were established in the 1890s.

Sanitation was to be provided at 8 primary schools and woodlots were to be established.

The proportion of total expenditure planned for the various project components is shown in Table 5.3.

	Proportion of Total Project Cost %	Foreign Exchange Component %
Roads	44	60
Regional Centre	38	63
Agriculture	16	81
Village Development	1	80
Phase II Study	1	85

TABLE 5.3 : Thaba Tseka Mountain Development Project (Phase I) Cost Allocation
Source: FAO (1975), p 12.

The initial project design estimated a total cost of $10.8 million for Phase I, although it was anticipated that there would be some cost escalation over the four year project period [FAO (1975), p 11]. The final cost for Phase I was approximately $15 million, of which Canada contributed $6 million, the World Bank $5.5 million, the British Overseas Development Ministry (ODM) $1,5 million, and the Government of Lesotho about $2.4 million [CIDA (1980), p 2].

The foreign exchange component amounted to 65 per cent of the total aid disbursement. Most of this would be absorbed by consultant and expatriate salaries. Expatriate personnel were to fill the posts of project director, animal production expert, pasture agronomist, agricultural economist, project accountant, clerk of works and two technicians. Project staff were also to prepare a Phase II mountain area

development programme.

At the request of the Government of Lesotho the project was to be implemented within the existing Government structure and procedures. Whilst the project's road component would be implemented by the Ministry of Works, a new project division was to be established within the Ministry of Agriculture for the agricultural component. The various development activities of the project were to be coordinated by a "Mountain Area Development Coordinating Committee" under the chairmanship of the Permanent Secretary of Agriculture. The committee would also be responsible for the identification of a Phase II project.

The work of the project commenced in June 1975, with the setting up of a base camp, by the Canadians, at Thaba Tseka involving tents and small caravans, and the planting of trial crops commenced in October. After the construction of prefabricated houses, staff were able to move their families to the mountains by January 1976. The building of an office and warehouse in Maseru was then undertaken, as well as the construction of a farmers' training centre and a workshop at Thaba Tseka. By the end of the first year of operations the project had physical and operational bases at Maseru and Thaba Tseka.

Infrastructure Development

In the early conception and planning of the project, it was recognised that considerable housing would be required for technical assistance and local field staff at Thaba Tseka. It was also planned that Thaba Tseka, because of its central location in the mountain region, would eventually develop into an administrative and commer-

cial centre for the mountain interior. The proposed road, financed by the World Bank, and a new airstrip finaced by CIDA, were largely justified on the basis of such further development. Early planning envisaged that residential and commercial development would evolve as the project expanded in subsequent phases. But, after the first year of operations, there were substantial deviations from earlier concepts of how the project should be implemented. Plans unfolded for the construction of a town of some 300 houses, including provision for a business district complete with a centralised water supply and sewerage system. In addition to the road and airstrip, an electricity transmission line from the lowlands (and South Africa) was to be built. These altered plans were embarked upon, even though existing finances would not meet the increased scale of the construction phase of the project.

Thus, during the second and third years of the project, the predominant focus was on the construction of the town, and all efforts were devoted to the difficult logistical problems of mounting a major construction programme in the remote rural environment of the mountain region. Architectural and engineering consultants, many associated with South African firms, were engaged to prepare designs for the houses and the water and sewerage works. Building construction was planned around the use of concrete blocks, which were to be manufactured at Thaba Tseka.

The nature of the construction programme and the design of the houses became significant factors in determining the overall impact of the programme on the surrounding area, and in shaping local residents' perceptions of the project. The sophisticated design of the houses and the emphasis given by project staff to the rapid and "efficient"

completion of the construction phase, meant that contractors and skilled labour were mostly hired from the lowlands to manage the building programme. The resident population was thus deprived of a desirable share of employment opportunities, and the original plan, that the building programme should provide a major avenue for training local artisans, was ignored. Traditional skills, such as stone masonry and thatching, could not be exploited as the building designs required construction techniques utilising concrete block walls and slate roofing.

The houses were also poorly designed for the harsh climate in the mountain region. No extra insulation was built into the walls or ceilings and it was assumed that electrical heating appliances would be adequate. Little consideration was given to the use of solar energy for water heating, although the incident solar radiation in the region is high - even in the cold winter months, which are generally cloudless. Roof over-hangs and side wall parapets (supposedly matching the shape of traditional huts) effectively blocked out any passive solar space heating. The size and cost of the houses (many with attached car garages) were wholly out of proportion to the social and economic environment. Not only were local staff unlikely to be able to afford the heating bills for the houses (indeed many occupants later allowed their electricity supplies to be cut off), but local perceptions of the nature of the rural development project were bound to be influenced by the building of houses which cost more than a hundred times their average annual incomes from agriculture.

The townsite was a planning disaster. Sophisticated building standards and regulations meant that local people who had been drawn to the site because of possible employment opportunities were unable to

afford to build housing within the townsite. Those houses which had been built by the project were restricted, in the main, to expatriate personnel and government officials from Maseru. A shanty town (with no water supply or sewerage system) thus developed alongside the main town, and it was here that many of the services and businesses required by the town residents (such as shops, rented accommodation, hotels, bars, and transport companies) were provided by entrepreneurs. The project townsite thus became wholly associated with government bureaucrats and aid personnel.

This concentration on the creation of infrastructure also emphasised the way in which aid projects can add substantially to the recurrent budget obligations of the Government of Lesotho. Low cost and subsidised capital investments might provide the critical infrastructure for helping to gain access to rural areas, but it is important to examine the concomitant operating and maintenance costs of donor projects. The project director wrote:

> "....the major outcome of Phase I was a dramatic demonstration of the enormous capital and recurrent budget implications of undertaking major infrastructure development" [Thaba Tseka Rural Development Programme (1978a), p 3.].

Liaison and communication with relevant government departments and ministries was minimal during the construction phase. The co-ordinating committee never met regularly in this first phase and the project proceeded independently, seeking government approval only when required. In this respect, the Thaba Tseka Project was no different from the other large rural development projects in operation at this time. The Thaba Bosiu Project was being administered by an independent project authority which was geared more to fulfilling the specific operational objectives of donor agencies than pursuing the goals arising out of government policy.

By late 1978, over seventy houses had been constructed, the Farmers' Training Centre had been in operation for some time, and an administrative building containing extensive office space had recently come into use.

The haste to complete the construction of the townsite continued, even though the improved access road to Thaba Tseka had not been completed and appalling road conditions were greatly escalating transport costs.

The first written assessment of the project was completed in May 1978. It stated that:

> "The priority activity of the Project to date has been construction of the townsite houses and administrative offices. Construction proceeded as planned, and, despite major constraints, has been completed on schedule. The Project has been subjectively evaluated as successful in the construction phase by Government of Lesotho officials and by both Basotho and Canadian personnel. The speed of the townsite construction rendered impractical the use of local skills and materials, and the consideration of local values and customs.
>
> Agricultural and other rural development objectives have suffered as a result of the priority placed on townsite construction. The Project has, for the most part, failed to attend to many agricultural concerns stressed in initial Project documents" [Hughes and Norwood (1978), p 4].

Crop Development

Whilst this massive effort had been devoted to constructing an administrative centre for the project, very little work had been done to implement the original agricultural and rural development objectives of the project. This was particularly so of the primary objective of improved range management.

Since the majority of the farmers involved with herding were also

dependent on the subsistence cropping of limited areas of arable land, improved field cropping was considered a more realistic area to begin the process of agricultural development. The thinking was that if some farmers could be seen to be helped, to even modest levels of improved crop production, confidence in the project and rate of farmer participation would be increased with a total effect of greater cooperation in implementing the much broader measures required to institute range management.

The agricultural programme over the first three cropping seasons concentrated on research into the development of appropriate crop varieties and cultivation practices to improve production. It was argued that this experimental period was essential in order to develop a base, from which effective extension and improved farm output could materialise from demonstrated benefits of improved methods. A CIDA assessment in 1978 noted:

> "Perhaps the greatest benefit to date has been the experience attained particularly as concerns the realisation of the extreme constraints to crop production in the mountain areas and the limitations within which improvements must take place" [CIDA (1978), p 16].

Over 2000 plot tests were conducted on the experimental farm and at selected sites within the project area. One of the more important results concerned the relative success of Mexican varieties of maize, bred for high altitude, and which proved to be hardier and higher yielding than traditional varieties.

Closely associated with the research programme, was the initiation of a number of surveys and studies to further identify and define the physical and human resource base upon which agricultural and rural development could be based. Numerous technical and socio-economic reports were produced in order to provide a basis for further project

work. At the end of the second year, project staff had prepared 13 technical papers (7).

Extension

Agricultural extension constituted a further weakness of the project. By the second cropping season four extension agents were employed on the project and, by 1978, the number had increased to only five. A number of attempts were made to hold field demonstrations at selected plots cultivated by the project and a crop growers' association had been losely organised in the immediate vicinity of Thaba Tseka. Extension was never a priority of the project and extension agents were rarely involved in project planning sessions.

The first effort to support farmers was the establishment of five village distribution points (VDPs) within the first year of the project. These centres were to provide farm inputs such as seed, fertiliser, and farm equipment not readily available from other sources. Each centre was equipped with a tractor and basic implements for hire. In addition to a storeman and tractor driver, it was planned that each VDP would have an extension agent who would provide technical advice and supervise credit. VDPs were also to market agricultural produce.

Lipitso were held in the five main village areas to explain the purpose of setting up the VDPs and nearly all farmers initially welcomed their establishment. Of the 100 farmers interviewed in a survey, 95 had visited and used the VDPs. However, when interviewed some time

(7) Thaba Tseka Mountain Development Project, Quarterly Report April-June 1977, p 1

after operation had commenced, only 65 per cent were satisfied with their operation [Thaba Tseka Mountain Development Project (1977b), p 5].

The project management expected that the introduction of VDP facilities would encourage the cultivation of more fields. But, according to extension agents' observations, in 1977, the number of uncultivated fields around Thaba Tseka had increased more than ever before [ibid., p 11]. These expectations of project staff demonstrate the extent to which overall economic structures were ignored in local project design. There was no appreciation of the fact that migrant wages had increased so markedly in the preceding two years and that households were thus likely to be less dependent on agriculture.

The tractor hire system had been implemented to facilitate the timely planting of crops and to help overcome the shortage of suitable animal draft power. To this end five tractors were purchased in February 1976 and each was to be associated with a VDP. Although the demand for tractor hire was high from the onset of the project, it soon became evident that unless such an operation could be tightly programmed, it would be highly inefficient in the mountain region where small fields, steep slopes, and rocky ground all impede mechanical cultivation. By charging rates equivalent to those in the lowlands, it was soon demonstrated that the project would have to subsidise the operation of tractors, or transfer the charges to the farmer to a level where lack of viability and demand would effectively end the scheme. A decision was made to terminate the scheme and to sell the tractors to prospective local contractors. This had some unhappy (and not surprising) consequences with contractors being unable to pay back the purchase loans.

The overall effect of project attempts to induce technological change and improve agricultural production may be gauged by the fact that, in a review of the extension programme in 1978, it was estimated that fewer than 20 farmers may have benefited substantially from extension [CIDA (1978), p 24].

The most notable effort at promoting improved cropping through extensive project support was the potato programme, which was a consequence of plans by the government to establish Thaba Tseka as a centre for seed potato production for the country at large. The project was to undertake an extensive production programme whereby it would assume responsibility for the provision of seed and conduct planting and harvesting operations; farmers would be entirely responsible for weeding. It was planned that the project would finance all operations, handle the marketing of produce, and deduct all expenses when the crop was sold, leaving remaining profits for farmers. It was thought that this form of share-cropping would activate farmer participation to the extent that they would take over all responsibility for cultivation in future years. Over the 1976/7 cropping season some 20 ha. of potatoes were planted by the project on farmers' fields. Although crops and economic prospects looked promising, farmer involvement was marginal, to the extent that the project had to assume responsibility for almost all operations, including weeding.

In the next year, a crop association was formed with the intention of generating greater interest and participation in the potato scheme and to expand it to peas and wheat in following years. It was planned that the association would now assume responsibility for planting, weeding and ridging operations. Of the initial membership

of 53 farmers, 37 agreed to grow potatoes in the 1977/8 season. Although the previous season had indicated promising profitability, only 6 farmers ultimately participated in planting operations. Once again, the project took over the planting operation by employing local labour - now on some 54 ha. Little weeding was done and, coupled with poor seed, there was a high incidence of disease with a consequent low quality produce. In the event, 90 per cent of the total crop was diseased and unsuitable for seed stock. The project management subsequently decided not to harvest the crop but did agree to purchase the potatoes at a competitive market price. The farmers harvested some of the potatoes, for their own consumption, and a limited amount was sold to the project.

The project managers conceded that some lessons had been learned, including the folly of promoting a high risk, high cost crop which required a high management skill input, and of which farmers had had no previous experience. The importance of involving farmers from the start in the planning and implementation of projects was also recognised [Thaba Tseka Rural Development Programme (1978a), pp 6 -9].

Livestock Development

At the onset of the project, it was believed that the use of the arable land in the mountains could be substantially improved by employing better seed and practising improved methods of field cropping. At the same time it was obvious that arable land was too limited in supply, too widely dispersed, too remote from markets, and too dependent on supporting subsistence to advance towards surplus crop production aimed at contributing to Lesotho's staple food supply and cash reserves. Alternatively, the broad expanse of rangeland and

the large resident livestock population existed as the major means through which mountain area development and output could be achieved. What essentially was required was to develop a farming system which would improve subsistence cropping and range management and, thereby, permit livestock production to evolve as the predominant base for economic output and activity.

The Thaba Tseka Project was thus initiated on the premise that the extensive range and livestock population of the area represented by far the greatest potential asset to be developed in the mountain region. It also represented the greatest challenge, in terms of technical, institutional and social problems to be overcome, and the time which would be required to effect significant change to socio-economic benefit.

Some progress had been made towards livestock development. Research had identified appropriate grass varieties which would improve the range and had also confirmed the excellent regenerative capacity of the mountain rangeland. During this time, national legislation was introduced to control overgrazing and to encourage rational utilisation. But a great deal more needed to be accomplished before any improvement in livestock production and in the livelihood of farmers would be apparent.

It was thought that in order to develop livestock farming a certain amount of infrastructural development was required. There is little doubt, however, that the preoccupation with building the administrative centre for the project, particularly in the second and third years of the project, inhibited, and indeed impaired, the project's ability to pursue these primary agricultural objectives.

Research and Experimentation

Efforts towards agricultural development in Phase I of the Thaba Tseka Mountain Development Project were thus directed primarily towards research and experimentation. The main areas of activity are summarised below:

[1] Field crops, particularly wheat, maize, sorghum, barley, oats, brassicas, sunflowers, triticale and rye were tested to identify those crops and practices most suited to the mountain environment of the project.

[2] A variety of range improvement methods were investigated such as the use of different mixtures of grass seeds on different slopes, the use of seeding rates and the fencing off of small areas near cattle posts to record the regenerative capacity of the rangeland.

[3] Different fruits, vegetables and trees were tested for mountain adaptability.

[4] Technological innovations applicable to farm production and community development were tested. These included low cost latrines, an hydraulic ram pumping system and solar heating devices.

With the agricultural programme directed towards experimentation and the resources of the project concentrated on the creation of physical infrastructure, there was little possibility for the residents of the area to derive any immediate benefits.

Assessment of Phase I

An independent consultant, evaluating the first phase of the project, concluded:

> "Overall, however, the Thaba Tseka Project Area people consider neither the households nor the area to be better off. The factors influencing peoples' perceptions of status are varied and complex. Nonetheless, the quality of village life as perceived by the people and as measured by peoples' perceptions of wellbeing has not improved and has, in fact, declined" [CIDA (1979), p 149].

The emphasis on the construction of the townsite began to be viewed by CIDA as unfortunate, but not disastrous for the achievement of the primary rural development objectives.

An assessment by a CIDA official in 1978 concluded that:

> "Perhaps the best indication, however, that the building of the town has been a successful project undertaking is the dramatic institutional development that has taken place since housing, office accommodation, and public services have become available" [CIDA (1978), p 14].

The road, electric transmission line, and townsite were regarded as essential pre-conditions for development. Perhaps the houses should have been more modestly constructed; they should have incorporated training and the use of local labour and material; but, for CIDA, the essential hypothesis remained immutable. CIDA officials stated that:

> "....the agricultural programme of the Thaba Tseka [Project], has been highly successful in accomplishing much of the technical, infrastructural, institutional and social pioneering essential to making planned agricultural/rural development a practical reality. As it now stands, the project is aimed, organised and managed to prompt and spread agricultural improvement at the village level in line with early conceptions, government's priorities for mountain area development, realistic approaches to technical and human problems, and practical proposals to overcome constraints and generate feasible viable development" [CIDA (1978), p 33].

A new project director was critical of this assertion that physical infrastructure was a pre-condition for development.

> "The 'pre-condition' mentality is exclusively goal orientated, focusing on the end product. Actual development is, on the other hand, a never-ending evolving process. The key question that must be posed is not how fast we can finish this construction project so that we can get on with the next stage, but rather how best can we use this building phase to maximise social and local economic development" [Thaba Tseka Rural Development Programme (1979b), p 29].

He was nevertheless optimistic that the infrastructure could be used as a basis for a rural development programme with new emphases, and expressed the view that:

> "During the past three years, major investments have transformed a quiet, bucolic valley into a bustling new town. An area once noted for its remoteness and total deficiency of government services is now designated a district capital for the mountainous central region of the country. But if Thaba Tseka is to reflect the initial spirit of the agreement between the governments of Lesotho and Canada, it must be a growth centre dedicated to bringing services to the people, not a growth pole drawing people to the services" [Thaba Tseka Rural Development Programme (1978a), p 2].

However, the nature of the design of the project site and the fact that such a large proportion of the Phase I budget, and most of the energies of the project staff, had been absorbed in the development of a fully serviced townsite, the supporting infrastructure (road, electricity transmission line, water supply and sewerage systems), and the logistic support which it required. Such demands had a lasting effect on the programme's ability to effectively communicate with the residents of the district and involve them in the attempts to introduce technological change and rural development (8).

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(8) One survey noted that the "hostility of some chiefs and their subjects towards Thaba Tseka Programme drove enumerators out of some villages" [Thaba Tseka Rural Development Programme (1979c), p 2].

Thaba Tseka Rural Development Project (Phase II)

It had been planned from the beginning that Phase I would be followed by a second phase project. The clearest indicator that Phase II would proceed irrespective of the success of Phase I was the construction of a sophisticated townsite with accommodation for more than 80 families. Clearly, the townsite was not designed merely to serve the 1500 households in the project area but was meant to serve as an administrative centre for the entire mountain area. This intention was confirmed in the Second Five Year Development Plan (1975-1980):

> "Although the major emphasis of the project is on agricultural production, the project is broad in scope and includes physical and social infrastructure, encouragement of rural industry and the creation of government machinery to administer a new tenth district comprised of some of the mountainous areas of the adjacent districts" [SFYDP, p 103].

The new Thaba Tseka District would cover an area of 464,000 ha. with a population of approximately 90,000 people.

Phase I was scheduled for completion in April 1979 but, due to the escalation of construction activities, CIDA funds for local costs were exhausted by May 1978. The Government of Lesotho provided funds to maintain project functions and CIDA continued to support technical assistance and training during the interim period before the design of Phase II was finally approved.

The contracts of many of the Canadian cooperants expired in early 1978 and a new management team arrived. Before long, a reassessment of the project's activities was undertaken and, within the context of planning for the second phase of the project, much innovative thought and effort was given to orienting the project more towards its origi-

nal rural development objectives.

In March 1978, the Permanent Secretaries of the various Ministries met and decided to combine the immanent creation of the tenth District with the planned development strategies for Phase II of the Thaba Tseka Project (9). At that meeting the Ministry of Agriculture representative stressed the need for an integrated approach to rural development and recommended the convening of a Thaba Tseka Coordinating Committee, which would initiate and coordinate government services in the district.

A draft Plan of Operations for the second phase was prepared by the on-site project staff in consultation with the Coordinating Committee in April 1978. This initial document stressed the need for "bottom up" planning, decentralised and integrated development administration, and flexibility as key concepts to the success of the second phase. It stated that:

> "....rural populations must be involved in the planning and implementation of the proposed changes to their own projects and programmes....an effort should be made to integrate the efforts of various ministries to minimise the duplication and misallocations of scarce resources. In order to provide integrated services, planning must be done at the District level.....Planning must follow a 'learning by doing' approach. If the project is to be really responsive to the needs of the people, the budget can be developed as the project evolves" [Thaba Tseka Rural Development Programme (1978b), pp 1,2].

It was planned that the concerns of the first phase would be broadened to include "quality of life" objectives such as health, education, and village infrastructure. The draft plan of operations was finally completed in December 1978, after discussion with CIDA officials. In February 1979, the Chairman of the Thaba Tseka

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(9) The Thaba Tseka District was officially inaugurated in March 1980.

Coordinating Committee described the goals of the TTRDP as experimentation in development orientated institution building, decentralisation of decision-making, and involvement of people in their own development. All development and administrative activities were to be coordinated and integrated at the District level and, if successful, would serve as a model for the other districts of Lesotho.

It was concluded that the Thaba Tseka Coordinating Committee should be an advisory body and that the project would be implemented under the District Administrator, subject only to the policy guidance and direction of the Coordinating Committee. Thus, an area-based agricultural project, which had focussed primarily on infrastructure development and on range management, was transformed into a district development programme, with all Ministries combining to participate in an integrated and innovative approach to development in the mountain area.

The Coordinating committee met monthly. It consisted of the Deputy Permanent Secretaries, and senior government officials of the various interested ministries; it included the project management, and was chaired by the Permanent Secretary of the Ministry of Agriculture.

These developments must largely be attributed to the motivation, initiative, and aggressiveness of the new project management. In the process of developing a new and broader institutional framework, the project, through the director, emerged as the agent providing the leadership and coordination to institute the changes and developments.

Phase II was to run from 1 April 1979 to 31 March 1984. CIDA was to become the main donor, and was to contribute $7,683,000 (Canadian)

over the five year period [CIDA (1980), p 4]. The Government of Lesotho's contribution was to be M2,058,000 (10).

Plan of Operations

The goal and purposes of Phase II were laid out in a Plan of Operations which formed the basis of a Memorandum of Understanding between Canada and the Government of Lesotho.

> "The overall goal of this project is to increase the capacity for self-reliance in agricultural production and to improve the quality of life of the Basotho people of the Thaba Tseka District of Lesotho" [CIDA (1980), p 1].

The specific purposes of the second phase were:

> "a. To improve the quality of life of the mountain people of the region by way of improving the quality and output of livestock and rangeland, raising of educational participation and training opportunities, construction of essential village infrastructure, creation of vital village organisations and improving sanitation and health.
>
> b. To double the commercial output of crops and livestock from the Thaba Tseka District by the end of year five of Phase II of the Project and increase incomes derived from farming.
>
> c. To increase the participation of Thaba Tseka District residents in the decision making process with regard to the economic development of the areas through their involvement in village committees and other decision making media so as to achieve by year five of the Project a 60% rate of participation.
>
> d. To enable the Thaba Tseka Mountain Development Project to continue to provide the people of the mountain district with assistance in meeting their basic human needs" [ibid, p 3].

The programme was also to aim at:

> "...continuing identification of those technological

(10) Thaba Tseka Rural Development Project (1980). Minutes of the Planning and Budgeting Session 19-20 November 1980, Thaba Tseka.

> innovations which are appropriate to the environment, identification of the needs of the local people and dissemination of the tested, new technologies and ideas, and on training of the people in the use of technologies to ensure that all changes can be appreciated and adopted by all" [ibid., p 5].

A meeting of the Thaba Tseka Coordinating Committee, in February 1979, queried these objectives, particularly the basis upon which quantifiable goals, such as the doubling of crop and livestock production, were formulated. The committee stressed the need to be flexible both in terms of budget and programme objectives, if the programme was to respond to the needs of the people of the district and was to encourage their participation in development planning (11).

A key aspect of the new phase of the programme was the immediate expansion of the rural development operations of the project into other mountain areas of the newly created District of Thaba Tseka.

The Plan of Operations lists ten distinct components of the project. These are summarised in Table 5.4 below.

Although a considerable proportion of the budget was still to be spent on infrastructure, much of this was to be directed away from the townsite. The increased expenditure on other components of the project reflected the increased emphasis on rural development. Some 18 per cent was to be spent on agriculture and 13 per cent on rural technology, education, and health. A considerable proportion of the Canadian disbursement was effectively to remain in Canadian hands and $3,3225,000 of the total $7,683,000 (42%) was to be absorbed on salaries for Canadian cooperants, consultants, and universities.

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(11) TTRDP (1979). Quarterly Report January - March 1979, Thaba Tseka.

Project Component	Amount Canadian $	Description
1. Training	200,000	Up to 6 Candidates per year for training abroad.
2. Cooperants	2,400,000	Up to 36 man years of Canadian technical assistance.
3. Consultancies	625,000	Canadian consultant services for agricultural and appropriate technology support.
4. Construction and Maintenance	1,200,000	District roads; village water supplies; maintenance of district buildings; trade centre; townsite; construction; village distribution points; stone crusher and cement block plants; drilling and blasting operations.
5. Agriculture	1,355,000	Grazing and stocking control; range development; livestock marketing; grazing associations; fodder production; animal breeding services; livestock demonstrations; crop research; extension; communal and commercial vegetable gardens; nutrition; farmer training; woodlots; and soil conservation.
6. Rural Technology	550,000	Rural Technology Unit.
7. Education	193,000	Additions to Thaba Tseka Primary school; audio-visual production unit; apprenticeship programme; COSC tuition.
8. Health	190,000	Health training; village health workers; latrine construction.
9. Administration	570,000	Staff; office supplies and travel allowances.
10. Evaluation	100,000	Comprehensive evaluation at end of 3rd year and at the end of the project; provision for annual reviews with the Government of Lesotho assess any needed changes to project aims and the Plan of Operations.

TABLE 5.4 : Thaba Tseka Rural Development Programme (Phase II) Project Components.
Source: abstracted from Plan of Operations [CIDA (1980)].

The scope of the project was greatly expanded. In May 1979, project documents listed 73 separate project activities: 28 of these were concentrated in the agricultural division; 17 in the technical division; 11 in the education division; 5 in the health division; and the rest in the support divisions - administration and the workshop [Thaba Tseka Rural Development Programme (1979d)]. In April 1980, 67 separate projects were listed. The agriculture division still constituted the largest section of the programme with 25 projects, followed by 15 in the technical division, 7 in health, and 6 in education [Thaba Tseka Rural Development Programme (1980a)]. Eight divisions were established: Agriculture, Health, Education, Technical, Community Development, Administration, Transport and Workshop, and Evaluation.

In 1978, the Agriculture Division was reorganised into 7 district sections. These comprised livestock and range management, crop production, agricultural research, woodlots, horticulture, agricultural extension (1).

One of the Agriculture Division's most important projects was the establishment, in 1978, of a grazing association. A large area of rangeland was fenced in order to control the number and quality of livestock, but only five farmers finally joined the association. In November 1980, the local Thaba Tseka Court ruled that the grazing association did not have exclusive rights to the fenced area. Fences were knocked down, gates were stolen, and many farmers in the immediate area drove their livestock into the area. The project pursued

(1) Thirteen woodlots were established by the end of 1979 with approximately 60,000 trees growing. In 1979, there were still only 5 extension agents.

the matter to Cabinet level, but no action was taken to challenge the court's ruling or to enact new legislation.

Research and experimentation continued to be an important part of the agricultural programme. Research work included fodder crop trials for sorghum, maize, brassicas, cereals, teff, and lucerne; range research with overseeding and range management, including stocking rate surveys (2).

All construction and engineering functions of the TTRDP were concentrated in the Technical Division which comprised five main sections: village water supply; road construction; townsite construction and maintenance; a trade centre; and a rural technology unit (3).

Very little was achieved in the construction of new village water supply systems, although this was listed specifically as one of the TTRDP's objectives in the Plan of Operations, and was cited frequently by the villagers as a top priority. A total of 36 systems have been installed in the District (11 by the project), and of these 18 are still working (5 of them installed by the project).

The involvement of the TTRDP in road construction began with the construction of the main access road from the lowlands through to Thaba Tseka. The Thaba Tseka Project had contributed M150,000 to the Ministry of Works for the construction of the last stretch of this road from Mantsonyane. Other road construction activities in the district at this time were restricted to labour intensive construction of tracks and bridle paths, with poor supervision, low construction

(2) See the detailed summary by D. Beckman (1981) of rangeland research.
(3) The work of the Rural Technology Unit will be discussed in Chapter 6.

standards, and labourers being paid with food-aid. In 1978, the project increased its involvement in road construction by taking over responsibility for the supervision of food-aid labour gangs from the Ministry of Rural Development. Training courses were run for supervisors in an attempt to improve productivity.

A model project to demonstrate efficient labour intensive construction methods was begun in 1979. In response to frequent requests, a 45 km road was built into the remote and isolated Lesobeng valley in order to facilitate the supply of needed services and the marketing of agricultural produce.

Based on ILO labour intensive road construction methods developed in Kenya, the TTRDP explored and devised construction techniques, technical standards, planning procedures, organisational and reporting structures, and training programmes which were appropriate to local needs and conditions, and which fully utilised local resources.

The project also cooperated with the Labour Construction Unit (LCU) in the Lowlands. This unit was established as an experiment to explore alternative road construction methods to those employed in the Government's national road network programme. The government was determined to complete the latter in as short a time as possible. Foreign contractors were mostly employed, with the inevitable consequences of Lesotho losing the most important potential benefits of infrastructure construction. The national roads programme was typical of an approach to development which dissects a complex social and economic process into distinct and isolated steps. The rapid creation of infrastructure was seen as an essential pre-condition for social and economic development but the use of capital intensive

machinery, foreign contractors and operators, meant that local and rural populations reaped few of the benefits from the substantial investments. The LCU sought instead to employ efficient labour intensive methods, which would give priority to the training and employment of local people.

The techniques developed by the LCU were adapted for the Lesobeng road project and the management of the TTRDP claimed that this construction project had demonstrated that labour intensive construction techniques could compete, on both a cost and on a technical level, with capital intensive methods used by foreign contractors.

In 1978, the Trade Centre was set up as a training facility in building and carpentry skills. Trainees were offered 10 month courses which incorporated both formal lessons and practical experience in their trade. Only hand tools were to be used and it was hoped that:

> "the standard and design of mountain dwellings and structure could be improved through developing tradesmen who appreciate the building principles involved. It would also give local labour a viable alternative to job migration to the mines in the Republic of South Africa.....small local industries could be established" [Thaba Tseka Rural Development Programme (1979e), p 8].

Building techniques were to involve the use of concrete blocks, and not the traditional stone masonry skills which were used widely throughout the mountain region in the construction of most dwellings. Thus it is likely that this course helped accelerate the movement away from the use of locally available materials and building design. The growth of square or rectangular concrete block dwellings with galvanised zinc sheet roofing was conspicuous around the project site. It is also apparent that traditional dwellings, away from the sphere of influence of the project, were better constructed, cheaper to build, and through using traditional materials, such as stone

walls and thatched roofing, were better insulated against the extremes of the mountain climate. On completion of the Trade Centre course, many of the trainees expected employment on the project site; they were reluctant to utilise their skills in their home villages, as the project initiators had originally hoped that they would.

Townsite construction and maintenance assumed a fairly low priority in Phase II and was concerned mainly with the conversion of garages into single accommodation units, and the installation of solar water heaters manufactured in South Africa.

The Health Division consisted of a district medical officer, a public health nurse, a nutritionist, and a public health inspector. The division was formed in 1978 and included in its work the establishment of a rural clinic programme and training for village health workers. Generally the programme was small, ineffective, and carried out with little consultation and coordination with the nearby mission hospital. It is difficult to imagine that the health programme contributed in any significant way to the improvement of health in the District.

The Economic Analysis and Evaluation Division came into being with the reorganisation of the project in 1978. The division was responsible for the collection and analysis of data, and produced a number of socio-economic surveys. In a household survey, carried out in 1979, problems were perceived to be chiefly hunger, unemployment, shortage of fields, and shortage of cash. Major needs were seen to be employment, water supplies, health facilities, better roads and transport. It must be said that these requests were mostly shaped by the desire of villagers to get projects for which the project was

willing to employ paid labour. When asked about the activities with which they most associated the project, those in the immediate vicinity of the Thaba Tseka townsite named construction. Other areas regarded tree planting as the most notable activity. The benefits from the Thaba Tseka Project were seen as employment and food aid. The main "successes" of the project were identified as the building of the townsite, planting trees, and improved transportation. In only one area (Ha Soai) did the villagers see the creation of a VDP as a major accomplishment which gave some benefits to crop farming. The major shortcomings of the project were seen as a failure to provide a mine recruiting agency [!], failure to provide more employment, and, in some areas, failure to provide roads. Other shortcomings recorded were the failure to provide shops and grinding mills.

The division also assessed the effectiveness of extension undertaken by the programme. Thaba Tseka had until then used the traditional extension agent system; agricultural extension agents were employed by the the project to offer advice to farmers. The evaluation report argued that this system had several disadvantages. In particular, extension agents were not accountable to the farmers and did not bear the consequences of possible failure (4). There were also wide differences in their abilities, respect engendered, and concomitant effectiveness of each agent. At no point did the field agent generate confidence in more than 40 per cent of the farmers which he served [Thaba Tseka Rural Development Project (1978a), pp 23-24]. This is, perhaps, not surprising as most of the agents' training was not

(4) A new variety of seed, which had not been fully tested in the mountains, was sold to farmers through the VDPs and resulted in much lower yields on farms. One incident like this confirms to farmers the wisdom of their cautious conservatism [Thaba Tseka Rural Development Programme (1979a), p 87].

specific to the mountain region. A study of 36 rural development projects [USAID (1975)] was reviewed in the report, which concluded that those projects operating with traditional extension services (defined as area-based agricultural generalists dealing with individual farmers) were the least effective in delivering useful and utilized agricultural knowledge. It was found that:

> "(i) A low cost method that can increase adoption rates is one in which small farmers are utilised as extensionists, para-professionals, promoters and directors of agricultural assistance in local areas. This method has proved especially effective when the technology to be advanced is very specific one crop, one subject at a time - which the small farmer can be taught to explain to others. This approach has led to higher adoption rates than those resulting from the efforts of a few highly trained professionals with a variety of messages to impart to the local population.
>
> (ii) Assigning extensionists to local organisations improves... accountability.
>
> (iii)When a farmers physical environment is poor and crop yields generally low, new technology has to evolve slowly with outside experts working closely with local farmers.... It is not cost effective to hurry technological innovation...." [Thaba Tseka Rural Development Programme (1978a), p 23 and 24].

Consideration of this report led the Thaba Tseka Project to adopt a lead farmer approach from 1978 onwards. Extension agents, in consultation with villagers, selected leading farmers who attended courses at the Farmers' Training Centre. There is, however, no evidence that extension agents became any more accountable to the farmers, or that technical knowledge was further disseminated by lead farmers.

Institutional Development

The final version of the Plan of Operations for Phase II (prepared by CIDA) differed considerably from the draft prepared by on-site

project staff in consultation with the Coordinating Committee. More emphasis had been given by project staff to institutional change in order to effect greater decentralisation and integration of project activities. The project management was able, nevertheless, to achieve a measure of coordination and integration of development orientated activities of the various Ministries in the district through the creation of the Division Heads Committee, which consisted of senior representatives of government ministries in the District. The committee met monthly and helped coordinate project planning and execution and enabled the more efficient deployment of resources.

Some decentralisation of decision-making and project execution was realised by the relaxation of specific government procedures, the voting of ministerial funds to district administration and the fielding of senior officers capable of independently planning and budgeting their own district level activities. An attempt was made to increase the involvement of the people of the District in the planning of development activities. In December 1979, a District Development Committee was established which allowed greater representation by the people of the district. Government officials, politicians and representatives of the churches were barred. Instead, the committee comprised elected villagers, representatives of ward chiefs and local interest groups.

An attempt was also made to ensure multi-donor participation in the district, and to move away from the prevalent belief that Thaba Tseka was a Canadian project. The Irish Government funded the establishment of a National Basotho Pony Stud at Thaba Tseka, and DANIDA and the US Peace Corps provided additional technical assistance.

The management of the Thaba Tseka, in collaboration with the Thaba Tseka Coordinating Committee, played a significant role in stimulating discussion in Lesotho on the merits of decentralisation. A workshop was organised at the National University to which senior government officials were invited. In his opening remarks the Senior Permanent Secretary stated:

> "Government accepts the need for rationalised decentralisation aimed at a more equitable distribution of resources in accordance with the needs and peculiarities of different districts and/or regions in the country" (5).

There was always an ambivalence of commitment on the part of the government in its support for decentralisation. A speech by the Prime Minister, in the National Assembly, that "decentralisation will be effected through a well co-ordinated institutional hierarchy" (6), began to hint at a renewed emphasis on centralised control, rather than a decentralisation of decision-making and project planning to the rural population.

The donor agencies also voiced support for decentralisation.

> "Decentralisation is directed towards increased democratisation in the society, which should be welcomed by any donor. However, it is a complex process and probably will take a very long time. It probably can be supported in different ways that will not detract from more tangible objectives" [UNDP (1980c), p 7].

Whilst the informal structure and scope of the TTRDP evolved with alacrity, the official legitimisation of the institutional process moved much more slowly.. However, as yet there has been no major legislative move to institutionalise the system of decentralised integrated district development administration. Proposals were put

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(5) Address of Mr Kotsokoane, Senior Permanent Secretary, to the Workshop on Decentralisation at the National University of Lesotho, Roma, 8-12 July 1980.
(6) Speech by Lebua Jonathan in the National Assembly, 13 March 1980.

forward by the project management for the establishment of a District Development Authority wholly within the government administrative structure. Staff and funds would be allocated to, and controlled at, the District level. A strong case was also made to localise the position of Programme Director. These proposals were never enacted, even though they were repeated again in early 1981.

Towards the end of 1980, there was once again a major turnover of expatriate personnel with the ending of cooperant two year contracts. The new project management were less experienced and did not attach as much importance to the concept of decentralised, integrated rural development, and as a result the momentum towards institutional development dwindled. Key government personnel, who had previously been involved in these developments, were moved to other posts (7).

The precise organisational structure and the relationships between project planning and finance, and the Government of Lesotho's activities in the District, had not been clearly defined in the Plan of Operations. Neither had any account been taken of the increased financial needs of the TTRDP which were implicit in its enlarged responsibility for rural development throughout the entire district. The new director of the programme wrote:

> "The progression to a district-wide role for the Project was, apparently, made with the full awareness of the sponsors. Yet it could hardly be said that the resources provided are adequate to make this a reality" (8).

The 1979/80 budget was overspent, and there were no allowances in the Phase II disbursement schedule for inflation. There was, however,

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(7) The Permanent Secretary for Agriculture was posted as Ambassador to Italy.
(8) Thaba Tseka Rural Development Programme (1981). Quarterly Report, April-June, p 4.

little response from either CIDA or the Government of Lesotho to appeals from project staff for additional support. Many projects had to be curtailed with local labour being made redundant. This caused considerable resentment and suspicion against the programme.

There was a great deal of confusion and uncertainty as to the government's own intentions regarding decentralisation, and it was not clear whether the previous experiments in institutional development had accorded with government policy. Power within the government appeared to be centred around a small clique of ministers close to Lebua Jonathan, and senior government officials were hesitant to make any bold policy initiatives.

The appointment, by the Government of Lesotho, of District Coordinators to each of the ten districts at the end of 1980, appeared to signal a commitment to move towards a more decentralised form of development administration. As the most senior government officials in each district, they were to have broad powers of coordination and liaison, ensuring that government policy was correctly interpreted and carried out, as well as overseeing security. No special guidelines were issued for the Thaba Tseka District and there was confusion as to the precise relationship between the office of the District Coordinator and the management of the Thaba Tseka Rural Development Programme. Basotho nationals began to report directly to the District Coordinator and the integrated structure of project planning, budgeting and execution began to break down. The District Coordinator seemed to encourage this process and was concerned to place as many staff as possible directly under his control. The programme was also requested to sack employees who were thought to be supporters of the opposition party. It appeared as though the chief

concern of the government in appointing District Coordinators was not decentralisation but greater "security".

Morale declined among the staff, and the main preoccupation of the TTRDP over the next year was to try and define its role, given the lack of commitment by the Government of Lesotho to develop a fully fledged decentralised and integrated district development programme, and the unwillingness of CIDA to become involved in "political" issues. The new director commented:

> "One faces a declining budget with no allowance for inflation. Further, there is no clear commitment from the local government to the programmes which it endorsed. This combined with a certain aura of uncertainty in the last few months, creates a very unsatisfactory environment in which to plan future programmes....In fact, what is called for now, particularly from the Government of Lesotho, is some guidance as to what it really wishes for the future of the TTRDP" (9).

Plans to increase participation in project planning by the people of the District also began to dissolve. Contact between the District Development Committee (DDC) and the Thaba Tseka Programme was minimal. The DDC produced a list of development priorities including the building of roads, clinics, a woolshed and a livestock marketing centre. They also requested more extension agents, increased veterinary services and improved breeding stock. There were suggestions for the smoother running of the graziers' association, and also for the need to involve traditional herbalists in the health programme (10). The proceedings of the committee were in Sesotho and expatriate project staff thus never attended these meetings. Only a perfunctory priority listing of development requests was produced in

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(9) Thaba Tseka Rural Development Programme (1981). Quarterly Report, April-June, p 3.
(10) Thaba Tseka Rural Development Programme (1980). Minutes of the meeting of the District Development Committee - 9 October 1980, Thaba Tseka.

English and these were never formally incorporated in project planning sessions.

Once again, rural development activities of the programme were neglected. The preoccupation of the Phase II project team with integration, decentralisation and institution building, mirrored the almost exclusive emphasis of the Phase I project on the creation of infrastructure at the expense of agricultural development. The Thaba Tseka Programme is due to be phased out in 1984 at the end of the current funding period. There is little evidence that this huge investment in the mountain region has had any effect in raising agricultural production or improving the well-being of rural households.

RURAL DEVELOPMENT POLICY

International aid agencies have had considerable influence in shaping overall rural development policy in Lesotho. Apart from their involvement in the design of individual projects, donor conferences have also been held in which aid agencies have explicitly influenced agricultural and rural development policy. Donor conferences were held in Maseru in 1975, 1977, and 1979. The Government of Lesotho outlined general policy objectives and proposed various development projects. Donor agencies prepared joint responses to these plans, and frequently offered their own suggestions. At the 1979 conference, called to review the Third Five Year Development Plan, the aid agencies specified that:

> ".....special attention will have to be paid to the development of agriculture...It is therefore suggested that a multi-donor conference be organised next year to consider how to increase the contribution of agriculture in income and employment generation....Such a conference could be prepared on the basis of a multi-donor assessment of problems being faced in the development of agriculture in

Lesotho." (11).

A multi-donor mission subsequently visited Lesotho. The Cooperative Crop Production Programme was much criticised for its inefficient use of subsidies and its heavy reliance on mechanised inputs from South African farmers. Specific recommendations were made concerning land tenure with the clear inference that aid would be withheld unless the requisite changes were implemented.

A number of initiatives have been made by donor agencies in the past to effect institutional changes in Lesotho in order to control agricultural and rural development policy more closely. Although the bilateral aid agencies generally preferred semi-autonomous rural development projects centred in specific areas, multi-lateral agencies began to express some concern at the lack of coordination and integration of rural development projects in the country.

Rural development activities were executed by a variety of Ministries including Agriculture, Health, Education, Works, and the Department of Community and Rural Development, then part of the Ministry of the Interior. The latter department had been primarily concerned with rural community-based projects, such as village water supplies, mountain access tracks, feeder roads, footbridges, conservation works, and communal gardens. A Ministry of Rural Development was formed from the existing Department of Community and Rural Development in 1976.

In 1977, the UN Administration Committee on Co-ordination sent a task force on rural development to Lesotho. Following the recommendations

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(11) Remarks by the Regional Director for Africa of UNDP on behalf of donor agencies [Kingdom of Lesotho (1979), p 112].

of a subsequent report [UNDP/FAO (1978)] a Policy Co-ordinating and Implementing Unit was established in the Ministry of Rural Development in 1979. Known as the project for Assistance in Integrated Rural Development, and funded by the UNDP with a grant of $742,000 over a two year period, the project aimed at better co-ordination, at both national and district levels, between the various technical ministries [UNDP (1978b), p7]. The infrastructure created under this project was also intended to strengthen channels through which rural people could participate in the planning, execution and maintenance of rural development programmes.

UN Volunteers were assigned to work in each of the 10 districts as District Resource Planning Co-ordinators. The information on each village, collected and stored by the UNVs, was to be used to evaluate village needs, as well as to assign project priorities.

In spite of these measures, a lack of co-ordination of development activities has persisted. The Ministry of Rural Development has community development officers in the field, who are responsible directly to the Ministry. Most large-scale rural development projects have fallen under the responsibility of the Ministry of Agriculture. The Department has agricultural officers in each district and has also established farmer associations at village level (12). Until 1981, the most senior official at district level was the District Administrator, who was a staff member of the Ministry of the

(12) The confusion surrounding policy is further demonstrated by the fact that the Ministry of Agriculture did not have its contribution to the Third Five Year Plan ready in time for the draft plan, and when the plan was finally published the chapters on Agricultural policy had already been superseded by the "Blueprint for action on Agricultural Development" published in November, 1980.

Interior. This Ministry also retained responsibility for the Chieftainship. In 1981, District Coordinators were appointed as the most senior government official at district level, and were responsible directly to the Senior Permanent Secretary in the Prime Minister's Office.

Despite the many projects and programmes in Lesotho, no formalised means exist for local people to participate in the planning or execution of development projects. The District Development Committees supposedly "co-ordinate development activities and secure the involvement of the people's representatives" [TFYDP, p 134], but, in reality, they are composed of representatives of the Government, the chieftainship, traders, and representatives of appointed village development committees. Requests for development assistance generally reflect the balance of interests between these groups. Ordinary village people effectively have no say in either government, or in development activities which affect them.

Rural Development Ideologies

The influence of international aid agencies on rural development policy and technological change has perhaps been greatest at the ideological level. Policy statements by the Government of Lesotho tend to be made in response to donor agency rhetoric concerning the importance of integration, "bottom-up" planning and the need to direct aid towards the poor.

The quinquennial requirement (encouraged by international aid agencies) for preparing national development plans, produces one of the few publicly available sources for analysing apparent government pol-

icy. The government has stated that:

> "The need for effective rural development in the Third Plan is abundantly clear. The basic tenet of our policy is to design programmes to ensure that social and economic benefits reach the poor and that Government action assists the poor to help themselves. We are now particularly concerned with the poorest of the poor within the rural sector, the bottom 25 per cent of households who have few resources of any kind" [TFYDP, p 128].

This emphasis on the rural poor mirrors the policy statements of the aid agencies, particularly those of the four major donors (UNDP, World Bank, USAID, and CIDA) which have funded large rural development projects in Lesotho. For example, the World Bank defines rural development as:

> "....a strategy designed to improve the economic and social life of a specific group of people - the rural poor" [World Bank (1975b), p 3],

and the UNDP notes that:

> "A primary objective should be to improve the quality of life of the rural poor. This implies the involvement of the rural poor in the development process and requires their participation in the decision-making process and the implementation of these decisions" [UNDP (1979b), p 11].

Recently, there has been limited debate within the government on a strategy for generating a viable pattern of rural development within the overall development strategy. The Ministry of Rural Development has stated that its objectives are to:

- continue to execute integrated rural development activities in specific parts of Lesotho, not as independent area based projects, but as experiments in the optimal use of available resources, and of the existing Government machinery
- develop a system of bottom-up planning involving local communities and field workers, with emphasis on the mountain and southern areas
- distil the replicable solutions provided by the experimental activities and begin to apply them throughout the country" [TFYDP, p 138].

The government ostensibly recognises four key elements to a successful rural development strategy and these are summarised below [TFYDP, pp 128-131].

Integration

Lesotho's bureaucracy is still highly centralised, with administrative and technical functions organised vertically from the Ministries located in the capital. It is now beginning to be recognised that the lives of rural people, and the determinants of their behaviour, are not organised along sectoral lines and that development in rural areas must, accordingly, integrate activities. For example, a programme to improve the nutrition of children, involves not only nutrition education, but also an integrated programme which encourages village gardens, constructs a clean water supply, introduces pit latrines, and employs village health workers. Again, a programme to improve crop production may involve the provision of improved agricultural inputs, marketing outlets, rural roads, repair facilities for farm implements, a soil conservation programme, improvement of animal draft power, and land reform.

The policy statement argues that the government has recognised the need for co-ordination at at least three levels. In central government, the planning of projects must take account of the roles of all concerned ministries and backing from the centre is necessary for action in the field. At district level, the day-to-day activities of supervisory and field staff have to be coordinated. Finally, there has to be coordination of activities at the community level in the villages [TFYDP, p 129].

Decentralisation

If there is to be greater co-ordination and consultation at district and local levels, a large measure of discretion and responsibility must be accorded the lower levels of administration for both planning and implementation of development programmes. District Development Committees must be given the capacity for more effective action. To achieve effective decentralisation, a considerable upgrading of lower-level staff will be required.

Consultation

The government also claims that it recognises the need for consultation and the fuller involvement of local people in development activities.

> "We shall be involving local people in the full process of planning and implementing the solutions to our problems. A 'bottom-up' approach to development is essential" [TFYDP, p 130].

Again, these emphases have been largely a response to international aid agency policy statements. CIDA, through its involvement in the Thaba Tseka Project, and through the initiation of local seminars and conferences, has been particularly influential in shaping stated government policy on rural development. CIDA defines rural development as:

> "...an integrated, 'trans-sectoral' process based on activities designed to promote, particularly within the poor segments of the rural population, a substantial improvement in well-being as well as self-reliance" [CIDA (1976), p A-2].

The agency listed as priorities:

> "(a) sensitization of the rural poor not so much to their problems which they know only too well, but to their own potential and the means at their disposal to change their condition;

(b) examination of the food problem and related production, storage, marketing and distribution requirements;

(c) development of rural infrastructure and measures to improve or preserve soil conditions....;

(d) institution building, including the training of supervisory and managerial personnel, notably at the community or village level; and

(e) development of community services such as rural school and health services, and credit and banking facilities, to complement the above activities" [ibid., p A-6].

Furthermore, the agency noted that:

> "Applied research and practical training are prerequisites to effective work in rural development, and should be carried out concurrently. Applied research relates to both planning requirements (knowledge of the communities, and the data base), and implementation (appropriate technologies and institutions)" [ibid., p A-7].

Nearly all of these policies were given some expression in the Thaba Tseka Rural Development Programme. Yet, ultimately, there was a lack of commitment; integration, institution building, and decentralisation were attempted, but were never fully implemented. There is a hollow ring to these policy statements of both aid agencies and the recipient government which reflects their ideological character. For example, on the same page of the document which emphasises the need for "bottom-up" planning, the government of Lesotho revealingly states:

> "In order to achieve effective consultation, target groups have to be made fully aware of the objectives of a particular programme and what the people can expect to get out of it" [TFYDP, p 130].

The implication here is that the government decides which groups are "targeted" and what the objectives of development programmes are.

It may be argued that the very nature of the aid process is such that, in reality, it does not easily allow decentralised decision-

making and planning. If large sums of money have to be transferred to the rural areas it has been thought easier to achieve this through "national" schemes directed towards "target populations" in "implementation zones". Foreign aid, thus, increases the tendency towards centralisation of development administration and donor projects directed at rural areas have reinforced these tendencies. Rural development policy pronouncements have remained, all too often, at the level of rhetoric and ideology. The aid process requires apparent adherence to these ideologies, and the Government of Lesotho has attempted to maximise aid disbursements by appearing to incorporate the principles enshrined in policy statements of international aid agencies into its own development plans.

SUMMARY

Some of the key features of post-independence rural development projects are summarised in Tables 5.5 and 5.6. A number of superficial observations are immediately obvious. Firstly, there has been a tendency for rural development projects to increase both in their scope and in the size of their budgets. The area covered by the Thaba Tseka Project was more than 200 times greater than that encompassed by the Leribe Project, and the annual budget was approximately seven times greater.

Secondly, the sources of development funding have gradually diversified. The first post-independence rural development project, the Liphiring Integrated Project, was funded by Britain and its design was not dissimilar to many of the colonial pilot projects, incorporating impractical proposals such as amalgamation of land holdings and the culling of livestock. However, since the early 1970s,

PROJECTS	OBJECTIVES	COMPONENTS	RESULT
Linhiring Integrated Porject	To increase rural productivity through dryland farming and livestock development.	Farmers associations; amalgamation of land; livestock culling; soil conservation	Poor wheat yields, financial losses; poor farmer participation
Leribe Pilot Project	To demonstrate the impact on production of an integrated approach to agricultural development and to test the acceptability of semi-cooperative farmer oranisations.	Simple farm input packages, improved seeds, insecticides, fertiliser, extension services: soil conservation; training programmes	Increased crop yields and farm income (M20 to M40 p.a.) Project terminated at end of pilot phase
Khomokhoana Rural Development Project	Intensification of crop and livestock production; involvement of farmers; and dissemination of technical knowledge.	Improved system of credit, farm inputs and marketing; integration of soil conservation with agricultural improvement	Good yields on demonstration plots but poor on farmers' fields, ineffectual extension, unsucessful use of sophisticated machines
Senqu River Agricultural Extension Project	Promotion of agricultural development and cash cropping; strengthening of extension; identification of constraints on rural development; strengthening of government services.	Improved livestock, crop and conservation practices; irrigation; credit; training; planning for phase II; detailed socio-surveys	Failure of consolidated blocks; financial losses; ineffectual extension; little farmer participation
Thaba Bosiu Rural Development Project	More assured subsistence; increased income from agriculture; erosion control; compilation of data for the design of similar projects.	Farm input packages, marketing; rural access roads; demonstration; instruction; implement repairs; soil conservation; asparagus canning; semi-autonomous project authority	Inceased farmers consumption of inputs; little evidence of increased yields; ineffectual extension
BASP	Incremental improvement to farming practices and crop yields throughout lowlands and foothills.	Farm inputs; access roads; VDPs; credit; extension; marketing; planning capability; surveys; evaluation; training	Delayed start; problems with funding; ongoing - too soon to assess
Thaba Tseka Mountain Development Project (Phase I)	Establishment of regional centre in the mountain region; rangelend development.	Infrastructure, roads, townsite, electricity supply; crop and rangeland experimentation; VDPs; training	Concentration on infrastructure development at the expense of agricultural improvement; local alienation; no perceived benefits
Thaba Tseka Rural Development Programme (Phase II)	To increase the capacity for self reliance in agricultural production and to improve the quality of life of Basotho in the Thaba Tseka District	Institutional development; decentralisation; integration of agriculture, health, education, and rural technology; training; evaluation: livestock and crop improvement; soil conserv.	Collapse of integrated and decentralised initiatives; many research results; no improvement to agriculture or welfare evident

Table 5.5 : Objectives, Functions and Results of Rural Development Programmes in Lesotho.
Source: Extracted from discussion on individual projects above.

Project	District	Area (ha)	Period	Donor	Amount
Liphiring Integrated Project	Mohales Hoek	1130	1971-77	U.K.	M58,000
Leribe Pilot Project	Leribe	2000	1970-75	UNDP	$1,480,000
				GoL	$602,000
Khomokhoana Rural Development Project	Leribe	19,000	1975-80	SIDA	$2,800,000
				GoL	M1,450,000
Senqu River Agricultural Extension Project	Mohales Hoek Quthing	140,000	1972-74	UNDP	$219,500
				GoL	$49,000
			1974-76	UNDP	$1,540,000
			-77	GoL	$215,700
Thaba Bosiu Rural Development Project	Maseru	121,000	1973-77	IDA	$5,600,000
			-79	USAID	$3,300,000
				UNCDF	$185,000
				GoL	$3,000,000
BASP	Lowlands Foothills	295,000	1978-	IDA	$6,000,000
				EDF	$3,900,000
				UNDP	$20,000
				W.Germany	$4,7000,000
				UK	$3,900,000
				GoL	$7,700,000
				Farmers?	$1,100,000
Thaba Tseka Phase I	Maseru Leribe	46,000	1975-78	CIDA	C$6,000,000
				World Bank	C$5,500,000
				ODM	C$1,500,000
				GoL	C$2,400,000
Phase II	Thaba Tseka	464,000	1979-84	CIDA	C$7,683,000
				GoL	M2,058,000

TABLE 5.6 : Large Rural Development Projects in Lesotho.
Source: See discussion on each project above.
Note: US $ unless otherwise specified.

Lesotho has come to rely more heavily on multilateral agencies such as the UNDP, World Bank, and on bilateral agencies such as USAID and CIDA.

Thirdly, in spite of this diversity, the nature of the various large

rural development projects has been remarkably similar. The Leribe, Khomokhoana, Senqu, Thaba Bosiu, and BASP projects have all incorporated the provision of farm input packages with such components as improved seed, fertiliser, extension, credit, and marketing. Nearly all of them also involved similar measures of soil conservation and livestock production. There were, of course, features which were different in these projects, but these were concerned mostly with special activities such as asparagus canning at the Thaba Bosiu Project, or the creation of a new town at Thaba Tseka.

The cynical comment has been made by an observer of Third World development issues (13), that the nature and content of rural development projects is determined primarily by the project design team's preference for one, or more, of three options:

[1] simple replication of a previous project design (in order to avoid time-consuming and awkward study of yet another "targeted area"),

[2] larger and more complex projects (in order to have a greater public impact than any previous project in the country), or

[3] esoteric projects of particular concern to themselves.

Such an analysis might not be too far from the truth. Nevertheless, the interplay of interests between aid agencies, the Government of Lesotho, and the supposed beneficiaries of aid, has had an important effect on the nature of rural development projects and attempts to induce technological change. Significant in this process, has been the stated policies and ideologies of aid agencies.

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(13) H. Dickinson, Edinburgh.

We have noted above how government policy on rural development has been, to a large extent, a direct response to aid agency policy pronouncements with their emphases on programmes to improve "the quality of life of the rural poor" [UNDP (1979b), p 11], "bottom-up" planning and integration. These policies and ideologies have also influenced the design of particular projects. For example, the concept of integration has been incorporated into most of the rural development projects surveyed above.

"Integrated rural development" has become a fashionable catchword in the development literature of the 1970s, particularly since the World Bank identified it as a priority and planned a quinquennial allocation of $3,500 million for the period 1975 to 1979 for this purpose. Integrated rural development is justified, firstly, by arguing that rural development is part of a wider process of social change which needs a broad and integrated approach and, secondly, by maintaining that scarce government resources should be used efficiently by optimising inter-ministerial cooperation.

Integration implies not only the "horizontal" integration of project components, but also the "vertical" integration of project activities with national policy objectives and programme administration. All too often, integrated programmes have been required to accomplish far too many visible results in too short a time period and, therefore, have been able to allocate only limited commitment and effort to the development of institutional capability and vertical integration. It is noticeable that the Khomokhoana, Senqu, and Thaba Bosiu Projects (and probably also the Thaba Tseka Project, when the current funding period lapses) have left no institutional structures whereby the various development programmes might continue in the respective

project areas.

The Thaba Bosiu Project, and the Thaba Tseka Rural Development Programme during its first phase, were administered by semi-autonomous project authorities, independent of local administration. This is an arrangement frequently found in countries where local institutions are considered too weak to execute integrated rural development projects [Lele (1975), p 127-130]. These projects incorporated efficient, technically orientated values and management structures. As such they were highly successful in establishing infrastructure and a core of agricultural research. In comparison with the indigenous government administration, these project authorities benefited from a clear orientation towards achieving visible and measurable results within a specific time. They had more independence and greater financial resources than local government and, usually more technical and management expertise. However, they have suffered from a limited impact on the population of the area.

The fundamental premise on which these projects were developed and ultimately approved was that if an appropriate level of technical and capital assistance was applied, a desired level of social and economic progress could be accomplished. In all of the projects discussed above, key positions were filled by expatriates. However, reliance on internationally recruited skilled personnel creates a contradiction in the project design from the beginning. Investment has been judged primarily by the criterion of an acceptable rate of return, calculated on the basis of quantifiable production targets derived from standard input-output coefficients for physical inputs such as fertiliser and seed, and do not explicitly take into account the high cost of expatriate skills which have been used in these

projects. The higher the proportion of expenditure on expatriate staff, the greater the need for ambitious production targets to carry the burden of these costs so that an acceptable internal rate of return can still be achieved. These ambitious short-term production targets make it extremely difficult for rural development projects to accomplish their objectives successfully.

The large area-based rural development projects were effectively designed to solve all the physical, institutional and socio-economic problems, which had developed over the past hundred years, within a short-term integrated project effort. Their objectives were to raise national agricultural production, but no prior analyses were made to identify the factors which were limiting agricultural production.

The project document for the Thaba Tseka Project envisaged that crop yields would more than double over a five year period, with over 60 per cent of farmers participating in improvement schemes. The result, of course, was very different - with agricultural development progressing little further than the carrying out of research trials.

It has been noted that, in East Africa, similar integrated, area-based projects have been successful in developing new rural development methods, techniques and insights, but many projects were found nevertheless to fail;

> "....the benefits which derived from them have been limited to the small populations involved. Through special inputs these projects may be made to work, but the vast majority of the rural populations of the country is usually unaffected in any positive way"[Chambers (1974), p 16].

The high level of political protection required, as well as the dependence on foreign inputs, proved to be additional potential sources of failure in the East African context; political priorities

would change, and turnover among expatriate staff would be high. Since this type of project has shown to be particularly sensitive to the calibre of management, the latter factor contributed heavily to project failures.

The concentration of expatriate technical expertise in semi-autonomous projects has made it doubly difficult for these projects to be integrated vertically into continuing development administration. Firstly, it has not been realistic for scarce indigenous trained manpower and undeveloped institutions to take over the extensive programme activities which had been managed by skilled expatriate personnel. Secondly, the desirability of continuing these programmes is itself questionable , given their over-ambitious goals and lack of concrete results.

The concept of integrated rural development has been criticised for some time. It has been argued that:

> "....policy or programme objectives are adopted for which no readily available closed system technology or programme methodologies are available. Integrated rural development can be described perhaps not too inaccurately, as an ideology in search of a methodology or a technology [Ruttan (1975), p414].

It is unfortunate that this ideology is frequently based on "targets" or "goals" of planners and rarely relates to the needs, desires, or perceptions of the small farmers who are the supposed beneficiaries of integrated rural development.

The rural development programmes reviewed above have all assumed that rural farmers are rational economic beings who think more or less in the same ways as western technicians. They assume, rightly, that the foreign technicians are mostly competent within their own cultural setting but they assume, dubiously, that this competence can be

transferred directly and simply by imitation or teaching to persons with a different cultural, social and economic environment.

Technological change in rural development projects is embodied primarily in technical assistance programmes, through the provision of foreign technical personnel. Table 5.7 shows the high proportions of aid disbursements which are spent on the foreign exchange costs of internationally recruited personnel.

Project	Donor	Percentage
Senqu River Agricultural Extension Project	UNDP	48
Thaba Bosiu Rural Development Project	IDA	63
Thabana Morena Integrated Rural Development Project	UNDP	56
Thaba Tseka Mountain Development Project (Phase I)	CIDA	65
Thaba Tseka Rural Development Programme (Phase II)	CIDA	42

TABLE 5.7 : Proportion of Total Aid Disbursement Allocated to Foreign Exchange Cost of International Project Personnel.
Source: Extracted from discussion on individual projects above.

Technical assistance, thus, consists primarily of technical knowledge transferred by European and North American aid personnel. In this respect, technological change in rural development is quite different to that in the industrial sector where the means of technological change are embodied primarily in the supply of licence agreements, blue-prints or new machinery which form the basis of the extension of technical knowledge among those involved in the production process.

It is important to recognise the significance of the interaction, in rural development projects, of foreign technical knowledge with indigenous technical knowledge and practice. Rural development, directed

and funded by international aid, involves programmes of technological change which reflect the technical knowledge of foreign personnel. This phenomenon has a crucial effect on the likely "success" of rural development programmes.

The design of rural development projects and the nature of technical programmes aimed at improving agricultural production have been shaped both by the prevailing ideologies, and by the social and context-dependent nature of technical knowledge (14). The corollary of questioning the wisdom of the direct transfer of foreign technical knowledge is to argue for the need for local research and development. One positive development in the series of rural development projects reviewed above, is the increasing emphasis which has been given to local socio-economic surveys and local research to develop and test improved agricultural production techniques. A great deal of valuable and detailed information has become available on the characteristics of farm households, on their preferences and attitudes towards agriculture, and on new seed varieties, cultivation and rangeland improvement techniques (15). Unfortunately, most of the results of this research have become available only towards the end of the projects' duration and this knowledge has never been transferred effectively to local farmers.

Very few projects have made provision for extensive local research before the project was designed and implemented. The small Ha Mokoae project is an exception. In the initial stages of this project, an

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(14) This point is discussed in more detail in the concluding chapter.

(15) The emphasis on local research has perhaps been most clearly expressed in the establishment of the Rural Technology Unit at Thaba Tseka. This research and development institution will be examined in Chapter Six.

extended period was spent learning about and assimilating local social and environmental conditions and knowledge before any attempt was made to implement large programmes. The fact that Ha Mokoae was also the only project (amongst those reviewed here) which was staffed and directed by a non-governmental aid organisation emphasises the extent to which the functioning of the official aid agencies constrains or determines the nature of the design of rural development programmes and the commitment to preliminary local research. The design of rural development programmes according to predetermined goals does not allow for time consuming and complex preliminary research which might point unpredictably to the need for programmes at variance with the accepted policies and technical procedures of the official aid agencies.

Much of the on-site research of these rural development projects was undertaken within accepted Western scientific and technical paradigms. Socio-economic surveys undertaken by post-independence rural development projects have frequently incorporated similar ethnocentric assumptions concerning what constitutes "proper" or "correct" farming practice and knowledge, to those found in many of the Colonial accounts of Sesotho agriculture. This is in spite of the professed concern of these later projects to understand and appreciate Basotho perceptions of agricultural production, and their castigation of the

> "...expert who knows even before he arrives in Lesotho what must be done, from his own perspective.....Unfortunately, the foreign aid system is inbred and self-directed to such an extent that it perpetuates the system of Western experts promoting what to the Western outsider appear to be technically sound solutions....The comment is often made, both by Basotho and by white expatriates, that the Basotho are incapable of the creativity and competence of the white farmers [in the Republic of South Africa]. Foreign aid which promotes that stereotype cannot succeed in producing

rural agricultural development" [Senqu River Agricultural Extension Project (1977a), pp 29,30].

Yet, in the same research report, the writer notes:

> "Serious farming,as we have seen, is prevented by the poor distribution of fields around the village, by the lack of tools and ploughing power, by the lack of labour, by the lack of such modern inputs as good seeds and fertiliser, and by the erratic climate. It is no wonder that the rural resident is not a serious farmer, when we consider all the obstacles to effective farming that he faces. It may well be simply the necessity to plough the fields in order to maintain rights over them is all that leads the rural resident to do crop farming at all" [ibid., p 18].

Although the first impression on reading this passage is that it is but another graphic account of the optimising traditional farmer whose actions are rational within the context of real and perceived constraints, the repeated reference to "serious" farming reveals the underlying assumptions of an alternative image of another kind of farmer, one who utilises more "correct" farming practices. The report never explicitly defines a "serious farmer". Must a serious farmer be a commercial rather than a subsistence farmer? Must he use modern inputs such as improved seeds and fertiliser?

Comparisons and characteristics based upon stylised and simplified perceptions are common wherever cultures are in contact. But the images discussed here gain added significance as they influence the design and implementation of rural development projects.

Without exception, the rural development projects reviewed above have failed to raise agricultural production and rural incomes significantly. Why has this failure occurred? Clearly, any answer to this question must take into account the way in which Basotho farmers' perceptions and attitudes to domestic agricultural production are shaped by the regional political economy and also the severe environmental constraints. Yet a full answer needs to go further than this,

and must probe more fully the implications of transferring Western technical knowledge to traditional Third World agrarian societies. This question will be explored further in the concluding chapter.

CHAPTER SIX

THE THABA TSEKA RURAL TECHNOLOGY UNIT AND THE SOLAR ENERGY PROJECT

The rural development projects which have been reviewed in this thesis have been directed towards the rapid achievement of visible results. The adoption of new agricultural technologies by farmers has generally been perceived as an increase in the use of one or more of three production factors; namely, land, labour or capital. Given the shortage of arable land, most programmes have concentrated on the development of land-augmenting technologies rather than on mechanisation, or other labour-saving technologies. The former involves methods of increasing productivity per unit area through the introduction of improved seeds, fertiliser and pesticides. These efforts necessitate an increase in capital resources and most programmes have had to include credit and marketing schemes. It is clear that these measures also require a high level of institutional support; and it is within this context that many of the rural development projects of the past decade may be understood, with their emphases on high levels of management and the provision of farm packages aimed at achieving rapid increases in agricultural production. The lack of success of these efforts has been noted and ascribed not only to the failure of adequate institutional development and support, but also to the failure to undertake longer-term local research which would adequately take into account the constraints of the small farmer.

The fundamental importance of local research and innovation in the case of rural development cannot be overemphasised. As one survey of rural development projects in Africa has remarked:

> "Where considerable effort has been made to adapt technology to suit small farm conditions, ...the response of small farmers to innovation has been truly dramatic" [Lele (1975), p 180].

Two different approaches to rural development research may be distinguished. The first form of research may be described as an interventionist approach to technological change. Generally, the rate at which increased productivity is achieved in new technologies is related to the extent to which the research worker allows himself to move beyond the limitations and constraints faced by small farmers. Research workers estimate an achievable level of institutional support and design the improved technology within these anticipated constraints.

The second approach is to limit research to technologies which fit entirely within the existing environment experienced by the farmers. This necessarily requires long acquaintance with the agricultural community and the undertaking of sophisticated and long-term research to determine what technological change is feasible within the existing constraints. It has already been noted that the farming techniques of the Basotho and their attitudes towards technological change have formed over a century in which Lesotho has been drawn firmly into the regional economy, and the Basotho have come to be more dependent on migrant labour than on agriculture. Given this overriding constraint, there are no simple solutions, and no readily available technologies, which can be readily assimilated by the Basotho in order to improve agricultural production and rural welfare.

It is unfortunate that rural development programmes in Lesotho have concentrated, often unconsciously, on the former approach, which is

highly sensitive to institutional support, in order to overcome the political and economic constraints which inhibit technological change in agricultural production. Because the level and quality of institutional support has been far from adequate it is difficult to assess accurately the potential of new technical knowledge and innovations which have been introduced. These considerations apply less to non-agricultural technologies. It has already been noted that the Basotho have generally responded enthusiastically towards any programme which would increase their domestic security and well-being and which involves a minimum of risk. This chapter will examine the introduction of non-agricultural technologies in order to understand further the process of technological change in rural development. An example of such a programme was the emphasis given to appropriate technology and the initiation of a solar energy project at Thaba Tseka.

The Thaba Tseka Rural Development Programme (TTRDP), with its added concerns of health, education and infrastructure development, has sought to introduce, not only improved agricultural technologies, but also those technologies aimed at increasing welfare in the villages. More than any other rural development project in Lesotho, the TTRDP has given explicit attention to the broader implications of technological change. The director of the project wrote:

> "While the Thaba Tseka team views the introduction of technology as an important means to improve the productivity and well-being of the mountain people, the approach taken in the introduction of new technologies must be considered with great care. Identification of <u>what</u> changes should be introduced must be accompanied by assessments of the effects that may result from introducing changes in traditional practices. The team does not accept the proposition that highly productive technological societies can simply transfer their methods, and expect success. This "carbon copy" mentality will not only disappoint goals, but will exacerbate the problems of poverty, inequality,

> malnutrition, and the general low standard of living. Technology cannot be transferred; rather, it must be adapted, matching the results of scientific research with local physical, social and economic conditions. It is a mistake to believe that the solutions to low production levels and overgrazing are resolved by simply introducing large doses of technology. It is also a mistake to dismiss all traditional ways as retrogressive. The obliteration of traditional cultures through modernisation may be inevitable, but it should be remembered that the thoughtless introduction of modern technology has, in the last two decades, impoverished many rural people of the world. Therefore, what must not be lost in the process of change, are the people's traditional insights and resources. Otherwise, technology applied indiscriminately as a "fix" may create more problems than it solves" [Thaba Tseka Rural Development Programme (1978b), p 27].

This concern with local research and the development of technologies was given practical expression in the establishment of a Rural Technology Unit (RTU) with the remit:

> "To adapt and introduce technologies which are appropriate in terms of cost, environment, maintenance, and use, in the mountain areas of Lesotho, and to increase the quality and standard of living of village people through increasing opportunities for training and self-sufficiency" [Thaba Tseka Rural Development Programme (1981a), p 1].

The emphasis on "appropriate technologies", and its implication that underused resources should be exploited, gave rise to the solar energy project. Before examining this project, it is of interest to look briefly at the structure and objectives of the RTU. The Unit represents an innovative and, as far as Lesotho is concerned, unique attempt at creating a research institution which would be responsive to local needs and constraints (1). But its success can only be

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(1) It should be noted that there have been other attempts at the research and development of technologies aimed at increasing the welfare of the rural population, or at stimulating rural industry in Lesotho, but these efforts have been meagre and uncoordinated. Apart from water supply and road construction technologies, the following projects may be noted:
1. The Thaba-Khupa Ecumenical Farm Institute formed an appropriate technology unit which established a blacksmiths' workshop.
2. The Ministry of Rural Development formed a solar energy section which carried out a year's practical research.
3. An inexpensive spinning wheel was developed and a mohair spinning project was launched to provide 2000 rural women with addi-

assessed by a full consideration of the technological changes it introduced and the factors which influenced the nature of its research and development programme.

THE DESIGN OF THE RURAL TECHNOLOGY UNIT

An initial project proposal for the establishment of a rural technology unit was made in August 1978, following contact by Thaba Tseka project staff with a blacksmithing workshop at Thaba Khupa in the lowlands of Lesotho. Thaba Khupa was funded mainly by the Danish aid agency, DANIDA, and was involved in the repair, adaptation and manufacture of agricultural implements. It had gained a reputation of being a successful example of the application of "appropriate technologies" and was one of the rural technology projects most often shown to international aid delegations visiting Lesotho. The TTRDP management hoped to duplicate the Thaba Khupa workshop at Thaba Tseka and expand its activities to include research and development of

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tional cash income. Spinners are given production credit for purchase of the spinning wheel, often from local credit unions, and they attend courses to learn spinning techniques and cooperative management. The project, set up with CARE assistance, sells raw mohair to the spinners and purchases the spun yarn for local and overseas marketing.

4. Following visits by the small-scale technology advisor of the Economic Commission for Africa (ECA) in 1976 and 1977, and discussions in the Central Planning and Development Office (CPDO), an Appropriate Technology Unit was set up in 1979, headed by an "expert", who was funded by the Commonwealth Secretariat for one year. The main function of the unit was to act as an information centre and to coordinate AT related activities. The unit was finally closed down in 1981. The Washington based aid agency, Appropriate Technology International, then funded a study to determine if there could be a further role for such an information unit. But, following an indeterminate report, lack of enthusiasm in government, and a substantial offer by UNIDO for an industrial development information service, the idea was dropped and the unit closed. Very little was accomplished over this period, other than the publication of annual newsletters and the establishment of a small library.

renewable energy technologies.

Construction of the workshop began in April 1979 and was carried out by trainees on the building course of the Trade Centre at the project. Difficulty was experienced in recruiting skilled artisans to staff the workshop. Local men were recruited, eventually, and were sent on training courses at Thaba Khupa which included blacksmithing and welding instruction. A Danish technician, visiting Lesotho, was hired to run the agricultural section of the Rural Technology Unit. By that time, a number of projects had already commenced. A consultant had been retained to evaluate wind power potential and to develop prototypes. A small-scale hydro-electric scheme was being constructed (2), and a solar energy programme was being planned. In the agricultural section, a draft animal programme was instituted and an inventory of tools and techniques commonly utilised in mountain agriculture was carried out.

Over the next two years, the aims and the organisational structure of the Rural Technology Unit were defined more closely. Its specific objectives were:

1. To assess and evaluate the present tools, techniques and implements employed by the people in agricultural production.
2. To develop and test improvements or alternatives to these, that will increase agricultural productivity.

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(2) ATI approved a grant of $8100 for equipment purchases and evaluation of the project, the purpose of which was to explore the potential for exploiting water resources by introducing a small scale experimental hydro-electric facility. The system was designed for an average stream flow of 6.7 l/sec and an installed capacity of 5-7 kW.

3. To develop and test prototypes that will meet recognised needs in agricultural activities.

4. To develop and test any potentially income generating or economically viable method, process or technique appropriate to the conditions of the mountain area.

5. To determine the area of needed improvement in any other facet of village technology and design, and to test prototypes and methods to fulfill those needs.

6. To encourage participation of village people in identifying needs and working with the RTU to meet those needs.

7. To increase opportunities for training and self-sufficiency by involving locally trained artisans in the research and development work and by encouraging an innovative attitude.

8. To offer technical, financial, accounting, and management training to encourage self-reliance and to enable local residents to eventually assume control of RTU.

9. To undertake any allied work which might be required to meet a recognised local need.

10. To liaise with other projects or organisations working in related areas" [Thaba Tseka Rural Development Programme (1981a), p 1].

The Rural Technology Unit was divided into three main sections as the organisational chart in Figure 5.1 indicates. In 1981, the positions of Division Head, RTU Coordinator, and the heads of the agriculture and village technology sections, were filled by foreign aid personnel. Two of these were university-qualified engineers and the other two were agricultural technicians with a number of years' experience and training. In addition, there were three other university-qualified scientists and engineers working in the village technology section - two Peace Corps Volunteers assigned temporarily to the RTU (3), and an American consultant.

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(3) The two PCVs had been sent to Lesotho to work on the USAID funded Renewable Energy Technology Project whose start had been delayed. The TTRDP Project Director managed to persuade the Peace Corps to second the volunteers to work on the RTU's programme on renewable energy rather than send them back to the US.

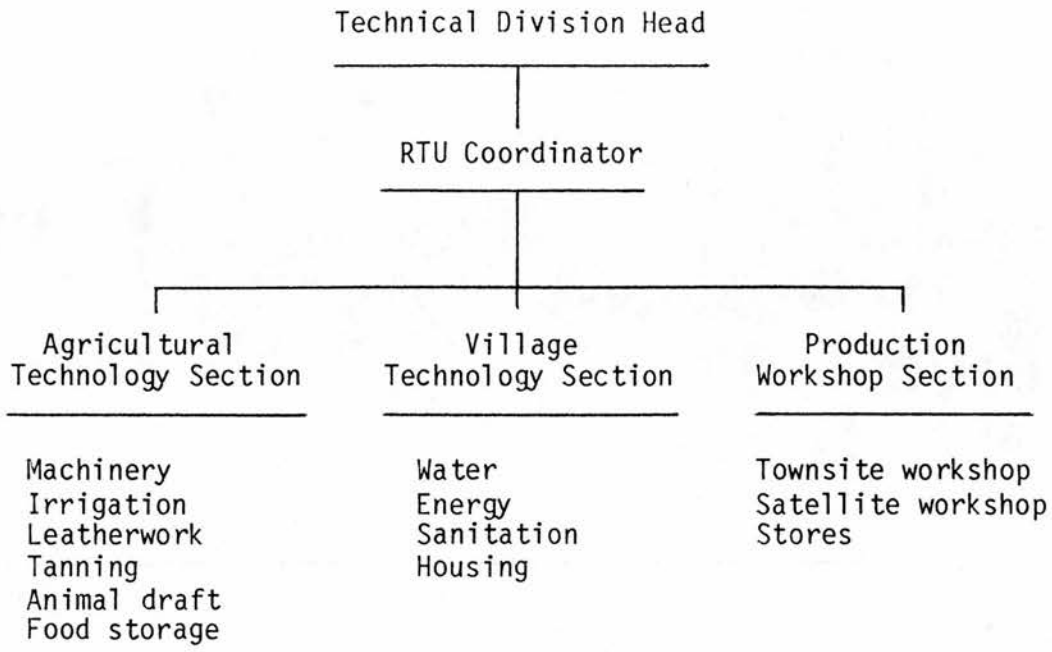

FIGURE 5.1 : Rural Technology Organisational Chart

There was a strong emphasis in the RTU on training Basotho to take over responsibility for functions which were being performed by expatriates, and all workers in the RTU were drawn into the planning and decision-making process. But, apart from the few Basotho who had been trained by the programme, there was very little indigenous technical capability. The workshop was headed by a Mosotho and, towards the end of 1981, the position of village technology section head had been localised, although all scientific and engineering decisions were still being referred to expatriate engineers working in the section. As might be expected, this continuing reliance on expatriate expertise was to have a significant effect on the nature of the R&D programme.

Agricultural Technology

The agricultural technology section aimed to:

[1] evaluate the tools and implements in use in the district, and to determine the possibilities for their local manufacture; determine which agricultural tools and techniques could be improved; and design, develop and test appropriate tools, implements and techniques to fulfill these needs;

[2] test and construct small-scale irrigation projects;

[3] improve leatherworking skills in the district, and coordinate the supply of raw materials and the marketing of finished items until such time as a locally managed cooperative was established to take over these functions;

[4] develop an appropriate small-scale production technique for the tanning of local hides in order to supply local leather workers;

[5] evaluate the types of animal draft available in the district, and determine the best utilisation of these by improved training and harnessing; and

[6] determine the needs for improved food storage and develop appropriate designs for these needs [Thaba Tseka Rural Development Programme (1981a)].

Ox-drawn agricultural implements were adapted for horse draft. Horses and mules were trained for draft power, animal trainers were hired, and a draft animal hire system established in order to overcome the severe shortage of draft power during the crucial spring ploughing months. Mobile maize shellers were constructed and various

imported agricultural machinery was tested, including the low-cost Tinkabi tractor, manufactured in Swaziland. Two of the more successful programmes of this section have been the improvement of saddlery production in the District, and research into rural tanning technologies.

Leatherwork and tanning

The horse has remained the chief means of transport for the Basotho, and there is a great demand for saddlery. These items have mostly been imported, but a few Basotho craftsmen have begun to repair and produce them.

In the past there had been some limited training in leatherwork. For example, in 1926, the Lesotho Evangelical Church opened a technical school in Quthing and offered a three-year course in saddlery and leathercraft. In 1965, this school was taken over by the Ministry of Education and the course now produces some five leather craftsmen annually. Another leather craft course was run at the Lerotholi Technical Institute in Maseru, but was closed in 1953. Most of the leatherworkers in the Thaba Tseka District, however, learned their skills from a craftsman at Mokhotlong who takes in apprentices.

In 1978, two saddlery makers approached the Thaba Tseka Rural Development Programme for assistance in the supply of raw materials and the marketing of finished items. Research indicated that none of the materials which were currently being used in saddlery production originated in Lesotho; none of the many hides and skins available in the district were being used for this purpose, although surveys showed that, in 1975, there were 1000 cattle and 30,000 sheep hides available from animals slaughtered in the district. Little local

knowledge existed for the treatment and tanning of these hides, other than the preparation of twisted leather ropes and the limited practice of de-hairing skins by covering them with ash and burying them for varying periods. Some skins were also preserved by smoking over open fires.

Initial efforts were devoted to extension programmes to educate villagers on the best methods of salting and curing hides and skins. A marketing system was then established to purchase unused hides for export. Tanning experiments were initiated in order to develop a simple rural tanning technology. Research progressed well, and funding is awaited to establish a small tanning industry.

Courses have also been run to upgrade the skills of saddlery and harness makers. These courses also offered tuition in basic accounting and business management. A successful supply and marketing system for saddlery production has also been established.

Village Technology

The village technology section sought to:

[1] develop techniques and devices to improve the delivery of water to villages, particularly through the local design, construction, testing, and installation of windmills and hydraulic rams;

[2] determine which types of solar devices are appropriate for supplementing or replacing present sources of energy, particularly in the areas of cooking and heating; improve the efficiency of utilisation of present sources of energy through the development of fuel efficient mud stoves and paolas; examine the feasibility

of small-scale electricity production, using renewable sources, such as hydro-power, wind, and photovoltaic systems;

[3] determine village sanitation needs and develop appropriate means of meeting these needs; and

[4] evaluate present forms of housing and identify possible improvements [Thaba Tseka Rural Development Programme (1981a)].

Among the projects undertaken was the successful installation at a clinic of a photovoltaic panel to charge batteries which powered a radio transmitter and emergency lighting, and the installation of a test wind generator and a micro-hydroelectric system. Hydraulic rams were tested at various sites and the performances of commercially and locally manufactured systems were compared. A windmill for pumping water was manufactured at the RTU workshop and is currently being tested. Little work was done on village sanitation.

The village technology section was responsible for one of the largest projects undertaken by the RTU - an extensive research and development programme on solar energy (4).

Workshop

The workshop's function was to:

[1] act as a repair facility for damaged agricultural implements and household goods which were brought in by villagers;

[2] produce prototypes for the other sections;

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(4) This programme will be examined below in some detail.

[3] produce and sell those devices that had been successfully tested and for which there was a known market; and

[4] train local artisans in metal working skills and assist in the establishment of village workshops in the district [Thaba Tseka Rural Development Programme (1981a)].

The workshop manufactured ox yokes, plough beams, cooking stands, and ox-drawn wagons, all for sale. Pots, ploughs, stoves and harrows were brought in by villagers for repair. A mobile repair service was instituted and various village meetings were held to market goods manufactured by the workshop. A satellite workshop was also established at the village of Ha Soai in the Thaba Tseka District.

The objectives of the Rural Technology Unit, and the the functions of its three sections, stand in marked contrast to the research efforts of most other rural development programmes which frequently served merely to test transferred technologies. The Rural Technology Unit was committed to analysing existing technologies in the District, improving or modifying them if necessary, testing innovations and manufacturing technologies appropriate to the needs and conditions of the area. The importance of local research and development institutions should be stressed. They constitute an attractive alternative to national or international technical institutes, research centres or universities whose research is often irrelevant to the concerns of rural producers. Rural technology centres offer possibilities for: assessment of local technical needs; formulation of programmes of technological development; improvement of traditional techniques; collection and dissemination of technical information from external sources; adaptation of transferred technologies to suit local condi-

tions; provision of supporting services and organisation for production; training; field testing of innovations; and formulation of area development programmes. Many of these functions were incorporated in one of the most extensive research, development and dissemination efforts undertaken by the RTU - the solar energy project.

SOLAR ENERGY RESEARCH PROJECT

Project Design

At the end of 1978, an American energy consultant, who had been travelling through Africa, arrived at Thaba Tseka and showed an interest in the work being undertaken there. He was hired subsequently by the TTRDP project managers to undertake a study of the potential for wind energy devices. A number of anemometers were installed and a test windmill was built to generate electricity for lighting for a doctor's house at the hospital. Most of the energy demands from institutions were, however, for hot water, cooking, distilled water, as well as lighting. Early conclusions of the project were that wind energy showed a less immediate potential, and required greater study, than did the more obvious benefits of solar energy. Incident solar radiation for the region was high even in the cold winter months, which were generally cloud-free.

In early 1979, the consultant, in cooperation with the project management, designed a programme of work on solar energy for six months. Its overall purpose was:

> "To evaluate the potential of solar energy and develop prototypes for harnessing and utilising this energy in various fields" (5).

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(5) Thaba Tseka Rural Development Programme (1979). Quarterly Re-

The stated objectives of the project were to:

"1. Evaluate existing solar data and the present level of solar technology in Southern Africa to determine its applicability to the Lesotho Mountain Region.

2. Establish local data collection facilities.

3. Utilising various designs of solar collectors set up a test rack for the purpose of correlating the above information, performance testing and training of personnel.

4. Design, build and test systems, using locally produced and tested solar collectors, to meet domestic and institutional water heating needs.

5. Design, build and test prototype space heating systems.

6. Develop solar energy in various fields i.e. solar produce driers, solar cookers, solar greenhouse heating systems, solar stills, solar cookers, etc.

7. Research the possible development and fabrication of water pumps....

8. Carry out all the above with regard for the economics and social acceptance of the..... items produced" [ibid., p 30].

The solar energy work began in February 1979, with the American energy consultant working for three months on the initial stages of prototype development, climate research and surveying solar energy work in other areas in Southern Africa. The consultant recommended that he and an American colleague, who had some experience in community based introduction of renewable energy technologies in the USA, be hired for a further phase of the project. The TTRDP management agreed to fund a second phase and, in June 1979, the two Americans toured the USA and Canada visiting universities and research centres involved in solar energy research. Some information and literature

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port January - March 1979, Thaba Tseka, p 30.

was collected, which has now been deposited in the library on solar energy at the RTU in Thaba Tseka. The costs for the first two phases of the project are shown in Table 6.1.

Phase	Component	Cost (Maluti)
I	Solar expert - 50 days	3500
	Living expenses - 75 days	750
	Travel expenses	1600
	Equipment	4500
	Contingencies (15%)	1550
	Phase I Total	11900
II	Two solar experts - 66 days	9200
	Air fares from N.America	2600
	Living expenses - 90 days	1800
	Travel expenses	1600
	Materials	10,000
	Training	4000
	Contingencies (15%)	4400
	Phase II Total	33,600

TABLE 6.1 : Budget for Solar Energy Research and Experimentation Project (Phases I & II).
Source: Thaba Tseka Rural Development Programme (1979). Quarterly Report January-March, Thaba Tseka, pp 31,32.

In April 1979, a proposal and a request for funds was presented to Appropriate Technology International (ATI), by the TTRDP Director and the Head of the Technical Division, for a third phase of the solar energy project. ATI's concern at this point was with the commercialisation of the technologies, and this aspect was written into the project design [ATI (1982), p 16]. ATI agreed, finally, in August 1979, to fund the project until May 1980. The funding period was

later extended, to December 1980, and the total grant amounted to approximately $47,000.

The objectives of this phase were to:

"1) Secure the services of four Basotho crafts people with technical training to act as apprentices. Phase III would not begin without the presence of these trainees. They would finish the phase with skills on building, installing and maintaining solar devices.

2) Assess the work of Phase I and II to determine what additional designs should be tried. Continue experimentation to expand on Phase I putting emphasis on solar cooling by evaporation, solar produce drying, solar greenhouses, cookers and passive space heating system skills.

3) Determine overall possibility of various solar designs and develop a method of production and identify a distribution system.

4) Build and install on a local village and institutional level several water heating systems, cookers, greenhouses or other promising solar development as a village test and as a training service" [Klein and Wyatt (1980), p A1-2].

The project was to involve 27 weeks of work. ATI was to fund the consultants' salaries, travel to Lesotho, and some US made solar testing equipment. The TTRDP was to provide for the trainees' salaries, local materials, consultant living expenses, administrative support, and travel within Southern Africa.

On completion of the initial ATI funding period, in May 1980, the consultants prepared a report which included detailed engineering drawings of the various devices which had been designed and constructed, together with a mass of climatic data relevant to the design and operation of solar energy technologies. As well as being a technically useful manual on certain solar energy devices, the report showed that the consultants had changed certain priorities

during the course of the project, in response to the reaction from end users of the devices. It also suggested that while mistakes had been made, many useful insights had been gained into dissemination techniques. The report concluded:

> "We have investigated energy needs of the District and developed a number of solar energy prototypes, many of which can be built locally. These ideas may prove to be of interest to local people, but there has not been sufficient time to fully evaluate their acceptance of these devices or techniques" [Klein and Wyatt (1980), p 13-1].

A chief recommendation of the report was, therefore, that the work be continued for a further period, employing only one of the consultants, the other American having already decided to return to the United States for personal reasons. This recommendation was endorsed by the TTRDP management, and ATI agreed to extend the funding period to December 1980. This final phase, it was claimed, would permit continued monitoring and wider dissemination of technologies introduced in Phase I, and would specifically produce:

> "[1] A selection of fully tested solar devices for cooking, water heating, food drying and battery charging with details of costs, markets, and most suitable manufacturing options, many of which will have been made by villagers themselves or sold to them.
>
> [2] Demonstrated improvements, and their costs and benefits, which can be made to the local houses.
>
> [3] Demonstrated and installed improved wood and dung-burning stoves and experience in the costing, market demand, and methods of manufacture.
>
> [4] Four Basotho with expertise in extension work on appropriate technologies to the villages, with a special understanding of the principles and manufacturing techniques applicable to solar devices and cooking methods" [ATI (1982), p 5].

Early in 1981, the work having been completed, the consultant produced a second report, equally useful in terms of technical and

evaluative data.

The Basotho who had been trained have successfully continued as a unit of the Rural Technology Unit of the TTRDP and the dissemination of the technologies developed, as well as some research and development work, is continuing. The American consultant employed on the project has since been hired by the Lesotho Renewable Energy Technology Project (RET) funded by USAID.

A number of points are evident, from the above discussion, on the factors which influenced the initial design of the project.

[1] The local residents of the District had no role in originating the project, defining energy needs, or directing research priorities. Instead, all of these functions were controlled by the project managers, i.e. by international aid personnel. No detailed surveys of energy use and demand were undertaken before the research and development priorities were set.

[2] The project originated from the concern of the project managers to be seen to incorporate an "appropriate technology" component into TTRDP activities, and renewable energy technologies were perceived as being intrinsically appropriate.

[3] The "professional" concern of individuals to secure lucrative contracts was a significant factor in the development of the project. A travelling American "consultant" convinced the project managers to hire him to undertake initial exploratory work in wind energy (his own particular field of interest). Subsequent project reports all recommended further contracts, the hiring of a colleague, a trip back to the USA, and two further

"project phases".

[4] The support of international aid agencies was vital in ensuring that the project was undertaken at all. Canadian aid personnel at Thaba Tseka agreed to the initial funding, and the final phase was dependent on ATI funding. The solar energy project was an obvious "target" for donor funding, given the incorporation of the notion of appropriate technology into aid agency policy pronouncements of the period.

The initiation, design and nature of the solar energy project was structured by the aid process. Canadian staff employed on the CIDA funded TTRDP established the aims and objectives of the project, and ATI also insisted, for example, that the commercialisation of technologies be an important component of the project. Renewable energy technology projects were regarded as important because they fitted in with aid policy and its commitment to the notion of appropriate technology.

Technical Devices

Some of the technologies which were developed, constructed and tested by the RTU are described briefly below.

Water Heaters

Several types of small batch water heaters costing M13, and capable of heating 10-20 l/day were built for village use. Five litre cooking oil tins, distributed by food-for-work programmes, were blackened and placed in a double walled sheet metal box insulated with 50 mm of fibre-glass and with a fibre-glass glazing panel fitted in a lid. The boxes would then be propped up at a suitable inclination to the sun.

Temperatures of 50 °C were obtained and it was hoped that the devices would save on fuels used to heat water for washing. Simpler versions, consisting of blackened tins placed in stone and mud enclosures insulated with dried grass and a fibre-glass cover, were constructed with a fixed orientation and inclination to the sun. These were less efficient than the earlier model but cost only M5 to construct. The various devices were tested extensively, but very few were sold. It is the opinion of the writer that there existed much less interest in water heaters than had initially been supposed by the consultants.

Food dehydrators

Several different kinds of food dehydrators were tested. The stone and mud wall version, suitable for household use, cost M8 to construct. A Ministry of Rural Development designed model, made from sheet metal, was found to cost M45. Again, interest in the technology was disappointing; at the start of the project it was thought by the consultants that the mud stone wall type would be the most easily adopted, but very few were sold.

Photovoltaic Panels

Photo-voltaic panels supplying batteries were tested at the RTU and, in May 1980, one was installed at a clinic. The system has continued to be monitored and is working well. The cost of the panels was over $3000 and no plans have been made to install similar devices at other potential sites in the district.

Solar distillation

The demand for distilled water is chiefly from clinics and garages which had previously imported it from the lowlands. One solar still

was built and tested at the RTU workshop; it cost approximately M50 to manufacture and worked well, although no dissemination of the technology was undertaken.

Solar housing

One of the consultants, with the permission of a local village headman, built himself a solar rondavel and lived in it for nine months. Better insulation was used, and larger windows were installed in North facing walls to increase the passive solar heat gain. Data was collected and much interest in the house was shown by village people. However, the writer observed no move by villagers to imitate any of these features and no organised dissemination of these technologies was undertaken by the project.

Cookers

A number of alternative cooking devices were constructed and tested. The performance of parabolic dish cookers and steam cookers had been found to be susceptible to wind conditions and development work on these devices was terminated. The construction and dissemination of hay boxes was more successful. Hay boxes provide a means for storing heated food in an insulated container and allowing retained heat to continue the cooking process.

Solar Oven

The oven consists of a double-walled sheet-metal box painted black inside with the space between the walls filled with fibre-glass insulation. The box is fitted with an inclined, double-glazed door and with four galvanised sheet-metal concentrating reflectors. The solar ovens performed impressively, and aroused great interest at village demonstrations where they often prompted the amazed exclamation:

"Mollo o kae?" (Where is the fire?). The units were able to cook a wide variety of foods successfully, including papa (maize porridge), rice, potatoes, cabbage, beef stew, chicken, bread and water for tea and coffee. On sunny days, temperatures of 120 °C could be maintained for a three or four hour period. The oven's performance was unaffected by wind and it even performed satisfactorily on cloudy days with only short periods of sunshine. For best performance, the ovens had to be reoriented towards the sun every half hour or so. It was possible, however, to cook satisfactorily by pointing the oven slightly ahead of the sun's trajectory at the start of the cooking operation, and leave it in this position, thus allowing women to go to the fields if necessary. The unit costs M 45, an amount which could be afforded by some returning migrant labourers, but which put the oven beyond the means of many poorer households. A number of different designs were constructed and tested extensively, over a period of 12 months, until one particular design was selected as being the most efficient and appropriate to local conditions.

Paolas

Paolas consist of no more than an old tin or twenty litre oil drum, perforated for ventilation, in which a fire is made, and on which the cooking pot is supported. Paolas have been used extensively by rural households for cooking and brewing. The RTU started manufacturing improved paolas subsequent to the solar energy project and largely as a result of the interaction of RTU staff with villagers, during dissemination trips and the holding of lipitso (village meetings). Here was a cooking device which was being used by rural households and which could be improved by increasing the efficiency of combustion. A number of prototypes were constructed from sheet-metal which proved

to be much more efficient than the conventional paolas in terms of fuel used for conventional cooking tasks. The paolas were designed to fit the standard range of three-legged cast-iron pots commonly used by rural households and were conically shaped to maximise the flow of the flame past the cooking pot. A novel two-stage construction method was devised which allowed rapid manufacture from master sheet metal patterns. The units cost approximately M5 and within a short period a regular market demand had been established.

Dissemination

In terms of the stated objectives of the project, the results show many areas in which it might be reasonably said to have failed. Wood stoves were never developed, but most important of all very few devices were disseminated. Table 6.2 shows the number of devices which were produced and sold by the end of 1980.

The performance ratings in this table are subjective assessments by project personnel and the estimates of the potential markets for each of the solar devices appear to be purely guess work. It is interesting to note that those devices with an estimated market of over one hundred (stone and mud construction water heaters, stone and mud construction food dehydrators, small solar greenhouses, and the solar rondavel) were not especially exploited in the next phase of the solar project, and did not achieve anything like the market potential envisaged. Instead, the sheet-metal water heaters and ovens proved the most successful and popular solar devices.

In 1981, metal ovens and the improved paola were in regular production at the RTU and, particularly the paola, were selling well. No

Solar device	No. built	Performance scale 1-10	Unit cost Maluti	No. sold	Potential market
Stone cold frames	2	-	30	0	<100
Solar ovens	12	8	50	10	<100
Parabolic cooker	1	-	65	0	-
Solar steam cooker	2	2	100	0	<50
Photovoltaics	1	8	2300	0	5-30
Hay box (grass & cardboard)	3	7	1	1	<100
Hay box (styrafoam & cardboard)	1	8	6	0	-
Water heater (sheet metal)	20	8	15	14	<100
Water heater (stone and mud)	25	6	5	19	>100
Food dryers (village)	1	8	50	1	<50
Food dryers (stone and mud)	3	7	8	2	100
Large greenhouse	1	-	1000	0	<100
Small greenhouse	1	-	50	0	<100
Solar Rondavel	2	8	300	0	>100

TABLE 6.2 : Solar devices constructed, September 1979 - December 1980, Performance Rating and Potential Market.
Source: ATI (1982), Appendix B; RTU records.

more photovoltaic battery chargers have been installed at clinics, no solar distillation units were being installed, no food dehydrators were being purchased by farmers, and no significant changes have been observed in rondavel design following the construction of the model solar rondavel. ATI also considered that the project had been disappointing and remarked that:

> "....very little success appears to have been achieved in the commercialisation of the devices: no local craftsmen, either at Thaba Tseka or in the capital of Maseru appear to be yet interested in manufacturing and selling the devices for their own profit. Only the RTU has established a couple of devices which it can construct and sell to local people successfully" [ATI (1982), p 7].

It may be argued that these results are not wholly unexpected.

Indeed, it would have been surprising if a whole range of solar devices had become suddenly popular, and in great demand, within such a short period. This lack of progress should be placed within the perspective of introducing a completely new concept and technology in a remote rural region where transport and communication are extremely difficult. Two consultants each worked for approximately one year, supported by no more than four untrained local people. Over twenty-five separate devices were built, tested, and to some extent disseminated. It might be said that the project was of some value in that it produced the following:

[1] full and detailed technical documentation of the devices built and tested, including costs;

[2] some indication of the more obvious cases of devices which were not likely to be adopted, and those in which some interest was shown;

[3] four trained Basotho with experience in construction and dissemination of these devices, who are continuing to operate as a unit within the RTU; and

[4] operating models of many of the devices, which are on display for visitors to the project site.

The ATI staff involved were satisfied that many of its objectives in funding the project were achieved, even though there were several obvious areas in which the project itself fell far short of its own stated objectives. ATI was, nevertheless, committed to creating a long term programme in Lesotho and to being a major force in the region in support of the appropriate technology movement (6). The

agency understood that the TTRDP was being regarded by the Government of Lesotho as a possible model for decentralised development administration in other districts, and it was thought that it (ATI) could become "influential in determining its (TTRDP's) management structure as well as its specific activities" [ATI (1982), p 6]. Further, ATI considered that Thaba Tseka's credibility in the field of appropriate technology had risen to the level where it was seen as the leader in the field in Lesotho. In the longer term, ATI hoped that it would be able to influence the design of the prospective Renewable Energy Technology (RET) project in Lesotho. The American consultant at Thaba Tseka was later able to join the RET project and ATI regarded this as justification for its funding of the solar energy project [ATI (1982), p 8].

Aspects of the original solar energy project were integrated into the continuing activities of the village technology section of the RTU. Extension efforts were undertaken by RTU staff in order to demonstrate and sell new devices. In 1980, a total of 21 lipitso were held and a display of various solar devices was mounted at the RTU and also at the monthly livestock market at Thaba Tseka.

A preliminary examination of the introduction of solar water heaters in the Thaba Tseka District was undertaken by the RTU, in October 1980, in two villages where households had bought mud and stone construction solar water heaters. The purpose of the survey was to obtain an evaluation of the solar water heaters based on the experience of those who had bought them, to determine the diffusion networks for solar devices, and to determine the usage of various types

(6) Two other AT projects were being supported in Lesotho by ATI - at Thaba Khupa and the AT information unit at BEDCO.

of fuel by the people in the villages.

It was found that those who had bought solar devices were, on average, of a higher educational level and were more likely to have some form of remunerative employment. They were also generally more wealthy, owning more livestock and had the use of more fields. The reasons given for buying the devices were that they helped to save fuel, that they would help to reduce money spent on paraffin, and the time to collect fuel. There was some confusion as to the precise use of the solar water heaters. Although 64 per cent of the respondents expected the devices to heat water, 36 per cent thought that they could be used for cooking, and 4 per cent thought that they were for food drying. The confusion arose in part because of a previous pitso where a range of solar devices had been demonstrated. All those who had actually bought solar water heaters were, however, amongst those who expected the devices to heat water only. All purchasers understood that the effectiveness of the devices depended on the weather. However, some devices were not being used through the winter months, some devices had fallen into disrepair, and others needed adjustment. Knowledge of the new technologies was fairly widespread in the villages where solar devices had been purchased, but did not spread much beyond. One conclusion of the survey appears to be that the new technology is regarded as a risk and that only the more well off households were prepared to experiment with, and purchase, new devices [Thaba Tseka Rural Development Programme (1981b)].

The RTU project team, in conjunction with the writer, also decided to embark on an extensive village trial to test the acceptability of solar ovens to villagers and to see if they would be willing to buy them after a trial period. In February 1981, a grant agreement was

negotiated with USAID to fund the village trial which began the following month, when a Peace Corps volunteer and the energy supervisor of RTU's Village technology section travelled to the village of Ha Mohau, in the Lesobeng Valley, to hold a pitso and discuss with the villagers the proposed solar oven project. The villagers were apparently enthusiastic and 45 ovens were transported subsequently by mules on the ten-hour journey over steep and rocky mountain terrain. The two extension workers lived in the village for a two-month period, during which time they instructed villagers in the basic aspects of solar oven use.

Visits to the village, made by the writer, indicated that villagers were wary of adopting the innovation and not all of the ovens could be distributed, even though they were offered free of charge. All those who accepted ovens managed to cook successfully. When the two extension workers left the village, at the beginning of May, six women were using their ovens four or more times per week, five used them one to three times a week, and the rest used the ovens only occasionally. The extension workers had managed to cook most of their food in the ovens; there is little doubt that they generated a great deal of interest, and extension workers received many visits from neighbouring villagers.

It was planned to measure the amount of fuel saved by the use of the ovens, but difficulties were experienced in obtaining accurate measurements. Joala would be brewed intermittently and this affected the amount of fuel used. There were also seasonal variations in fuel use which meant that measurements taken by the extension workers, during the short period in which they were in the village were of little value. From April onwards, villagers also began to spend most of

their time harvesting in the fields and, therefore, had little time to experiment with the ovens on a daily basis. When the village was visited again, in July 1981, villagers were still spending most of the day in the fields and were using their ovens only occasionally for heating water. Despite a prevalence of clear skies there was a widespread belief that the ovens would not work in the colder weather. They also indicated that since fires were lit, anyway, to heat their houses, they preferred to cook over the same fires. Most villagers, however, still believed that the ovens would save some fuel.

It was intended that the extension project would run for a year, at the end of which villagers would be given the opportunity of buying the ovens. Ha Mahau was visited in February 1982 by four RTU workers who found that most villagers were not using the ovens, although many claimed that they would be willing to purchase them. Subsequently, RTU staff have decided to pay less attention to solar devices and concentrate more on the development of fuel-efficient stoves.

It is clear that there are limitations to the widespread dissemination of solar devices. On the other hand, it is of interest to note that the development and dissemination of the improved paolas have been extremely successful. In this instance the decisive factor appears to have been that the technology involved was a simple, but effective, modification to a commonly used device. The RTU continues to manufacture and sell paolas without any significant marketing and dissemination effort.

Social and Environmental Factors Affecting Rural Energy Use

In order to gain a fuller understanding of the factors involved in the introduction of solar energy technologies in Lesotho, it is helpful to look at the patterns of rural energy use and demand. Tables 6.3 and 6.4 summarise fuel use patterns in Lesotho in 1980.

	Modern Fuels				Traditional Fuels				Total
Sector	Petroleum Products	Electricity	Coal	Sub Total	Fuelwood	Dung	Crop Res.	Sub Total	All Fuels
Urban Households	0.29	0.06	0.66	1.01	0.19	-	-	0.19	1.20
Rural Households	0.50	-	0.35	0.85	9.50	4.90	1.00	15.40	16.25
Agriculture	0.12	-	-	0.12	-	-	-	-	0.12
Industry	0.61	0.13	0.25	0.99	-	-	-	-	0.99
Commerce/ Institutions	0.24	0.14	0.67	1.05	0.1	-	-	0.1	1.15
Transport	1.14	-	-	1.14	-	-	-	-	1.14
TOTAL	2.90	0.33	1.93	5.16	9.79	4.9	1.0	15.69	20.85

TABLE 6.3 : Fuel Consumption by Sector, 1980 - Peta Joules
Source: SADCC (1982), Annex, Lesotho Output Tables.

Lesotho is dependent on South Africa for the importation of refined petroleum products, electricity, coal and small amounts of firewood. Although this dependence on South Africa further increases Lesotho's vulnerability and exacerbates the trade deficit, commercial fuels constitute only a quarter of the total fuel consumption. Three-quarters of the national energy demand is supplied by traditional indigenous fuels. It is clear, too, from Tables 6.3 and 6.4 that rural households are by far the largest fuel consumers. It is in this sector that Lesotho faces a growing energy crisis.

Fuel	Total Rural Household Fuel Consumption (PJ)	% Contribution of Individual Fuels	% of National Fuel Consumption
Petroleum Products	0.5	3.1	17.2
Coal	0.35	2.2	13.5
Fuelwood	9.5	58.4	97
Dung	4.9	30.2	100
Crop Residues	1.0	6.1	100
	16.25	100	78

TABLE 6.4 : Total Rural Household Fuel Consumption
Source: Village study, Best (1979), SADCC (1982).

The rural population of Lesotho has long been dependent on animated (human and animal) and traditional (fuelwood and dung) energy sources to fulfil the two major functions central to their subsistence: namely, the powering of the agricultural production cycle, including the cultivation, harvesting and irrigation of crops; and the feeding and watering of humans and livestock. Unlike the populations of the industrialised nations, the rural poor of the Third World, including Lesotho, use energy almost exclusively for life-sustaining activities. This irreducibility of energy demand, coupled with an increasing population, environmental degradation (including deforestation and soil erosion), and stagnating agricultural production, is one of the major problems facing Lesotho's rural population in a period of escalating world energy costs.

There is no rural electrification in Lesotho and rural households depend on four sources of fuel for domestic energy requirements: fuelwood, dung, crop-residues and paraffin (7). Cooking represents

(7) Coal is consumed by a small minority of wealthy households who

the major need for fuel, followed by house heating, warming water, brewing joala and lighting. Paraffin and small quantities of candles and coal are the only imported fuels used by rural households.

Fuelwood

The vegetation of Lesotho is chiefly grassland, with some small herbaceous multi-stemmed bushes, known to the Basotho as sehala-hala, which provide the main source of fuel for rural households. Women collect 10 to 30 kg bundles, two to six times per week, depending on the size of their families and the time of year. It has been observed by the writer that in some villages women have to walk up to 3 km to collect to collect sehala-hala. It is estimated that the average annual consumption is 1.5 tonnes per family. Demand is greatest in autumn and in winter there is a decline in brushwood consumption due to a substitution of dung for fuelwood. Sehala-hala is becoming increasingly scarce. In a study of domestic energy consumption in the village of Malefiloane, near Mokhotlong, 80 per cent of the women interviewed, asserted that it had become harder to collect brushwood and 87 per cent considered collection of fuelwood a burden [Best (1979),p11]. Sehala-hala burns quickly without making coals and thus does not provide much domestic space heating.

In recent years, there has been an attempt to increase the availability of fuelwood through the planting of village woodlots. Eucalyptus and pine species have been planted mainly and the most successful have been E. bridgesiana, E. rubida and P. radiata. The total area planted by mid-1982 was 3,500 ha. and a planting rate of approximately 1000 ha. per annum is planned for the next three years. Ini-

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arrange their own bulk purchases and transport.

tial harvests suggest that the average yields from mature plots range from 16 tonnes/ha. in the north, 9.6 tonnes/ha. in the central area to 4.8 tonnes/ha. south of Mafeteng. The woodlots project was established in 1973 and has been funded by the United Kingdom, the Government of Lesotho and the Anglo-American Corporation. The FAO, African Development Bank and the German government are considering funding an expanded afforestation project.

Wood is a much more scarce fuel than sehala-hala, and its use is controlled by the chiefs. In a survey of fuel used in six villages in the Thaba Tseka District, only 20 per cent of respondents reported having cut trees during the past year, although most preferred wood to either dung or paraffin as a source of fuel. The survey also showed that there is a basic lack of knowledge about forestry on the part of rural households and there were widely different views expressed as to when trees should be planted and cut. Such views persisted despite the National Tree Planting Day being in the optimal month for planting [Thaba Tseka Rural Development Programme (1980b)].

Dung

The shortage of fuelwood in Lesotho has resulted in a far greater reliance on dung for fuel than is usual for developing countries with similar agricultural economies. The Basotho refer to four categories of dung: khapane (from cows), kuluba (from horses and donkeys), lisu (dried manure which is cut and dug out of cattle kraals, usually twice a year), and moraha (wet dung dug out of kraals after heavy rains and formed into cakes which are dried in the sun). Not all families have access to lisu or moraha as not all own sufficient livestock, but khapane and kuluba are freely collected from the land. The average annual lisu production has been estimated at 670 kg per

cow, 6 kg per sheep or goat and 475 kg per horse (8). Dung is preferred to sehala-hala in winter because it provides space heating. The average annual household consumption of dung was estimated at 1.35 tonnes in Malefiloane.

Crop Residues

During the harvest season, many families burn matlakala (crop residues) such as wheat straw, maize stalks, and dried bean, pea and lentil plants. Women will often help to remove maize kernels from the cob for another woman and, in return, they will keep the maize cobs for fuel. Straw chaff is sometimes mixed with fresh cow dung and left to dry to form maphoroa, which is also burnt.

Paraffin

Many rural households possess primus stoves which are generally used for short cooking tasks such as boiling water for tea. Paraffin stoves are also often used when dung is not available and a few days' rain has exhausted the supply of dry sehala-hala. However, with increasing paraffin prices, ever fewer households can afford to use the stoves.

Lesotho imported 27 million litres of paraffin, worth M4.5 million, in 1977 (9). It is estimated that households consume on average 26 litres of paraffin per year, involving an expenditure which amounts to 2.5 per cent of household income [Best (1979), p 15]. In 1978, the price of paraffin was 25 cents per litre, by 1980 this had increased to 75 cents and in the remote village of Ha Mahau, for

(8) The mass has been measured at an average moisture content of between 5 and 8 per cent [Best (1979), p 13].
(9) A total of M17.6 million (8.8% of total imports) was spent on fuel and lubricant imports in 1977.

example, the price in 1981 was M1 per litre. These price increases have effectively ended any major shift to the use of paraffin and other commercial fuels for cooking and domestic heating.

With increased paraffin prices, rural households have been forced to rely more heavily on indigenous fuels. As a result there have been three major detrimental consequences of the increased use of fuelwood, dung and crop residues for fuel.

[1] The increased consumption of fuelwood has resulted in a further depletion of ground cover which has exacerbated the severe soil erosion in Lesotho.

[2] Dung and crop residues are not being returned to the soil as essential elements of soil structure and fertiliser. The result has been a progressive degradation of soil quality and a decrease in crop production.

[3] The growing scarcity of fuels has meant that more time must be taken away from other pursuits in order to forage for fuelwood. This burden has fallen most heavily on women and children and imposes constraints on agricultural production during peak periods of activity.

Given these fuel shortages and the importance of cooking in domestic energy use, it would appear that the solar energy project and RTU's focus on the production and dissemination of solar ovens was appropriate. The ovens are able to cook a wide variety of foods, common to the local diet, and can effect substantial savings in scarce fuelwood and dung. But, in spite of the substantial research and development effort, and a village trial where solar ovens were

offered free of charge, there was no significant adoption of the new technology by villagers, no maintenance of the ovens, and no attempts at modifying them to increase their performance.

The crucial question remains - why, despite these efforts, has there been an almost total lack of success in effecting technological change? It has been argued in this thesis that part of the explanation is revealed in an examination of the aid process which originated, funded and directed the innovation and dissemination of these solar technologies. Patterns of energy use and demand in Lesotho are not unique; indeed, they are remarkably similar to, and characteristic of, the rural energy problems faced by many Third World countries. The impact of the aid agency, ATI, on the initiation, design and implementation of the solar energy project should be assessed within the broader perspective of the response of major aid agencies to Third World rural energy needs.

SUMMARY : THE IMPACT OF AID ON RENEWABLE ENERGY TECHNOLOGY PROGRAMMES

Until the 1970s, very little attention had been given to traditional rural energy consumption in the Third World. Planning for Third World energy production, and aid agency funding of energy-related projects, focussed almost exclusively on the development of central electrical power generating capacity through the creation of large-scale power plants or the installation of on-site diesel powered generating systems. With the "energy crisis" of the mid and late 1970s, and the evolution of the notion of appropriate technology, there has been new concern for the provision of decentralised rural energy systems based on technologies able to exploit renewable energy sources. These concerns have been incorporated in aid policy, and aid agency

involvement in the funding of renewable energy technology projects has become substantial. In 1979, the International Energy Agency noted that more than 250 renewable energy projects had been funded by OECD bilateral donors with grants and loans amounting to more than $200 million. Most of this aid (86%) is accounted for by four donors: the United States, Germany, Canada, and Sweden [Ashworth (1980), p 259]. USAID has recently initiated and funded large renewable energy technology programmes in several Third World countries, including Lesotho.

The key to understanding the current lack of diffusion of renewable energy technologies to poor rural areas of the Third World lies in an examination of the policy and operating procedures of aid agencies. The determining factor in the introduction of these technologies is a need as perceived by project personnel, rather than a demand expressed by local villagers. The solar energy project at Thaba Tseka originated in this way - as, indeed, did the host institution, the RTU.

The response of donor agencies to rural energy projects has often been contradictory. In many cases, the bilateral donor's ideological concerns for providing assistance to the rural poor of the Third World are tempered with the commercial objectives of developing markets for the export of solar technologies. Such contradictions are sometimes reflected in the conflicting interests among different institutions in the donor country. In the United States, agencies such as USAID and ATI are, supposedly, concerned with improving the economic and social well-being of the rural poor and have been instrumental in the initiation and funding of RET programmes to this end. Yet these same agencies have to justify politically these

expenditures and grants and cannot ignore, for example, the US Department of Energy's Solar Technology Transfer Programme which seeks to facilitate the transfer of proven technologies from its technical R&D programme to the private sector. One of the elements of this programme is to assist in the development of an export market in the Third World for these solar technologies.

It has been argued that the industrialised countries have a long-term interest in the development of renewable resources, and the expansion of overseas markets is one way of funding the development of the necessary technologies [Hoffman (1980)]. An established demand for such technologies in overseas markets will provide an important stimulus to the nascent alternative energy sector in the industrialised countries, and will help to maintain the commercial viability of the technologies until the domestic market is more fully developed.

What makes the solar energy project of the RTU at Thaba Tseka an interesting case study is the extent to which such contradictions and paradoxes in the aid process are revealed. The project has provided no immediate market opportunities for American private sector solar energy manufacturers, apart from the insignificant purchase of a solar radiation data collection instrument and a photovoltaic panel. Markets were not sought for further photovoltaic panels, even though the device functioned successfully and it was estimated that there were potential applications at some 30 other clinics.

The project originated from the notion that solar energy technologies were "appropriate" per se. From the beginning there was, therefore, a preoccupation with the development of, and experimentation with, solar devices. Many of them were replicas of designs which had been

developed and constructed by alternative communities which were committed to self-sufficient, ecologically-sound life-styles within the industrialised countries. Indeed, the two American consultants hired for the solar energy project at Thaba Tseka came from just such a background. The project, thus, did not originate from an expressed need of local villagers, and comprehensive research was never undertaken to assess and understand local energy-use patterns and needs. It was thus only after the termination of the solar energy project that RTU staff were relatively successful in reorientating research towards the development and dissemination of the improved paola - a non-solar device, but highly economic and successful in achieving the same ends as those intended by the solar devices, namely, a saving of scarce indigenous fuels.

The significance of technical personnel in these aid programmes further reveals the paradoxes of the aid process and the ideological nature of the concern for introducing "appropriate" renewable energy technologies. For, although there was a serious intent to alleviate fuel shortages in the Thaba Tseka area, and much effort was devoted to the development, production and dissemination of efficient solar ovens, there is no doubt that the benefits to the consultants far outweighed those to the villagers of the area. Major conclusions of the various phases of the project consistently included recommendations for further contracts, and the greater proportion of aid disbursed by ATI for the project was spent on consultant fees, living expenses and travel allowances. In Phase I of the project these payments amounted to 57 per cent and, in Phase II, 52 per cent of the aid disbursed. Furthermore, ATI stated explicitly that a major justification for funding the project was that the experience gained by

the American consultant could be utilised by the proposed USAID funded RET project (and presumably, ultimately, in the alternative energy industry in the United States).

Technical assistance in the solar energy project took the form of the provision of technical personnel on short-term contracts, rather than the export of solar devices and the development of markets for American manufacturers. In this respect, the solar energy project was similar to the rural development programmes, reviewed in previous chapters, which attempted to introduce improved agricultural technologies. Processes of technological change were introduced through the transfer of technical knowledge through engineers and technicians from the donor countries. Technical knowledge based on preconceived notions, or motivated by ideological concerns, was transferred to an alien environment and to a rural population who had not sought it and which was both unable and unwilling to incorporate it into the common practices. The consequence, once again, was both a failure to effect technological change and to provide any increase in welfare for the rural population of Lesotho.

PART THREE

AID, IDEOLOGY AND TECHNOLOGICAL CHANGE IN RURAL DEVELOPMENT

CHAPTER SEVEN

DISCUSSION AND CONCLUSION

Technological change, in the predominantly agrarian nation of Lesotho, has been shaped by the two fundamental features of the country's economy: namely, migrant labour and international aid.

Central to the transformation of technical knowledge and the adoption of new technologies has been the historical process which has shaped Lesotho's economic structure and the growth of migrant labour. It is not necessary to summarise and discuss the effects of labour migration here once again; Chapters Three and Four have dealt extensively with Lesotho's political economy and the rural environment. It is sufficient to note that the dual dependence of rural Basotho on migrant labour and subsistence agriculture has had a profound effect on their perspectives and attitudes towards technological change and innovation in domestic productive activities. In this respect the case of Lesotho, although not typical, is not unique; it represents, in exaggerated form, the situation faced by many other southern African labour-exporting countries. It is difficult, though, to generalise Lesotho's dependence on labour migration, and the effects this has had on technological change, to the majority of other poor Third World countries. This is not the case with international aid, the second key factor structuring technological change in Lesotho, and the discussion in this chapter will concentrate on the significance of aid policies, ideologies and knowledge in structuring the nature of rural development programmes aimed at introducing technological change.

AID AND THE CHOICE OF TECHNOLOGY

International aid has become one of the most important sources of investment in many of the poorer Third World countries, and has become a major vehicle for technological change. Official development assistance to Lesotho, in 1979, amounted to more than 90 per cent of gross domestic investment in Lesotho. In six other countries in sub-Saharan Africa this proportion was higher than in Lesotho, and in no less than 17 countries in this region aid amounted to more than half of the gross domestic investment. The total amount of aid disbursed to these countries has increased nearly six-fold in real terms between 1970 and 1979 [World Bank (1981b), Tables 22 and 23]. The role which aid assumes as a vehicle for technological change is particularly significant in those countries which have a negligible industrial base. The common means for technological change, in the form of transnational corporation investments, licence agreements and the purchase of industrial processes and machinery, are largely inoperative in these countries, and the aid process has become the dominant means for the introduction of new technologies.

There are a number of ways in which international aid agencies influence the choice of technology in Third World countries. For example, technologies chosen for projects in which aid agencies are involved are generally biased towards a relatively high level of imported capital components by the restriction of agency financing to foreign exchange capital costs. There are pressures on the staff of regional aid offices to achieve lending targets and to maximise the contribution from the donor nation; these disbursements are contractual and long-term, compared with the uncertainties of local sources. These tendencies are reinforced by the fact that many aid agencies'

internal assessment of effectiveness are measured merely in terms of the amount of money lent and the number of projects processed. International aid agencies tend to finance equipment (usually high in import content) rather than labour costs, and new capital rather than maintenance. National governments rarely assess how far the detailed project designs submitted by the operating agency may have been biased towards a high capital and import content. Rather, aid is generally seen as a welcome addition to scarce domestic resources for investment and foreign exchange. There is, therefore, a danger that the pressures to maximise aid agency financing may skew the whole investment programme of the country in the direction of those sectors which contain presentable projects of high import, capital-intensiveness. The relatively low requirements of preparatory and design work in relation to the total project cost, which imported capital-intensive projects generally involve, make them attractive not only to local administrators but also to hard pressed staff of the lending agencies. The technological bias introduced by these factors is evident in such development projects in Lesotho as the earth-satellite communications system, the international airport, the national roads network and the Maseru water supply project.

The choice of technologies in development projects is also, in many ways, the consequence of a bargaining process between the local government and international aid agencies. The motives for aid are often the potential spin-offs from investment projects in terms of new markets and export contracts. The greater the potential market in a Third World country, the greater the scope for that country to influence the choice of development projects and technologies funded by aid agencies. This is less true of poorer Third World countries

with limited markets. Paradoxically, though, there is a sense in which their poverty itself serves to influence the nature of development programmes and technological change, and it is in these countries that the contradictions of the aid process are most clearly manifested.

The aid process has to a large extent been legitimised by the professed concern of donor countries for the poor of the Third World. This concern has been expressed in such ideologies as "basic needs" and "appropriate technology", and the focus on rural development for the poor. It will be argued later that, in a minority of cases, these ideologies are transformed into actual programmes, and, to the extent that aid constitutes a primary source for the introduction of new technologies in poorer agrarian nations, the impact of aid ideologies can be an important factor in the choice of technology in a manner very different to that described above. Instead of skewing the choice towards imported capital intensive technologies, aid may result in rural development programmes which initiate local research, development and manufacture of "appropriate technologies". But, before pursuing this argument, the ideological character of much of stated aid policy will be demonstrated with reference to the concealed interests of donor countries.

In global terms, very little aid is directed towards the poor. In the American aid programme, only 32 per cent of American aid (excluding the Economic Support Fund and food aid) goes to what the World Bank classifies as "low-income" countries. The top ten recipients of American aid received more than half of the total $5,600 million allocation made in 1980. Of these countries, only five are in the Third World - including Indonesia, Pakistan, Bangladesh and

Philippines, not all of whom are renowned for their commitment to the poor.

An analysis of World Bank loans also reveals that the concern for the poor is a minority interest. In 1979, approximately $10,000 million was lent to 75 countries. Ten countries - India, Indonesia, Brazil, Mexico, Korea, Philippines, Morocco, Egypt, Turkey and Colombia - received 56 per cent of the total aid disbursement. Only two of these countries are classified as "low-income" countries and the majority are notorious for their neglect of their poor [Lappe (1980), p 29]. Aid for agriculture and rural development has also constituted a small proportion of aid disbursements. It has been estimated that, in 1978, one third of World Bank loans were allocated to these sectors and, in 1979, the proportion was one only quarter [Lappe (1980), p 43]. It is difficult to calculate what proportion of these loans were actually directed towards the rural poor. Loans characterised as meeting the basic needs of the poor go overwhelmingly to build infrastructure, and projects aimed at increasing agricultural productivity also do not automatically benefit small farmers or the landless and hungry. The difficulties of assessing accurately if aid is directed towards the rural poor is compounded further by the fact that many projects are often merely renamed to fit new ideologies.

It should be stressed again that the availability of external aid to finance new investment in itself affects the choice of technology; for the interests of the donor agency then becomes an important element in the decision making process. Many considerations other than the needs of the recipient country may affect the type of aid or credits made available by the donor agency, and it may be argued that the form of aid frequently depends more on the requirements of the

donor country's economy than on those of the recipient's.

AID AND CONCEALED INTERESTS

Aid has never been an unconditional transfer of financial resources. Usually, the conditions attached to aid are clearly and directly intended to serve the interests of the donor countries. The aid process, thus, often results in Third World countries incurring various costs. These costs arise from procurement tying, political and economic commitments which have to be made for receiving foreign assistance, disbursement procedures of the aid agencies, the repayment burden and recurrent budget implications of project aid.

Procurement tying

The immediate advantages to the international donor agencies of funding development projects in Lesotho would not, at first, appear great. An examination of many of the aid projects reveals, however, that funding agreements frequently involve the procedure of procurement tying which stipulates that capital equipment has to be bought in the donor country. There are many examples of this phenomenon in Lesotho: among them are loans for the purchase of Canadian aircraft, German communications equipment and European water treatment technology. The advantage to the donor country in terms of orders and contracts from any one of these projects might seem insignificant but, cumulatively, business generated from aid agreements in Lesotho, Africa, and in the Third World in general, adds significantly to donor country trade.

The practice of tying foreign aid to the purchase of equipment in the

donor country began at the end of the 1950s in response to the balance of payment difficulties donor countries were experiencing at that time. This was the case with the United States when it began, in 1959, to tie supplies, financed by development loans, to US sources; subsequently, it insisted that funds, which were remitted to meet local costs of projects, were also used for imports from the US. In 1963, Britain began to tie aid in the same way. The blanket restriction on buying British can be circumvented only after lengthy delays, and then only in special circumstances. The proportion of British aid (excluding technical co-operation) which was fully tied to the procurement of British goods and services, in 1977, was 44 per cent. A further 19 per cent was limited to the procurement of equipment and services in either Britain or the recipient country [Arnold (1979), p 45].

The practice of procurement tying may transfer costs to the recipient countries for two reasons. Firstly, suppliers in the donor country, realising that the goods are financed under aid programmes and that the recipient country has no choice but to make this purchase under aid, charge a monopoly price. Secondly, the cost of production in the donor country may be higher than that from the traditional source, which is the main reason why purchases were not made from the donor country originally. Accordingly, the real value of foreign assistance is reduced.

A further economic motive for aid is the generation of employment for donor country nationals through the growth in export orders and also in the provision of "experts" to staff development projects. This latter aspect is seldom mentioned in the discussion on the costs of procurement tying in aid projects. But the fact that bilateral donor

agencies generally restrict their financing of project staff to nationals of the donor country often means that personnel costs are disproportionately high. These costs become significant in rural development projects where the costs of expatriate project personnel frequently constitute the major budgetary item.

A consequence of this policy is that most aid "disbursements" are spent, in effect, in the donor country. It has been estimated that three out of every four dollars in USAID's budget are used to purchase products and consultative services in the United States. During 1978, USAID financed purchases from over 3000 US corporations; the sum involved amounted to more than $1000 million [Lappe (1980), p 90].

Political and Economic Commitments

Some of the conditions attached to aid have been justified in terms of the need to promote economic development in underdeveloped countries, and aid is seen as a means for influencing general economic policies in specific directions. Particular emphasis is given to measures to achieve or maintain financial and monetary stability, the elimination of import and currency restrictions and price controls, and a greater reliance on market mechanisms for achieving growth. These preferences are generally based on an acceptance and upholding of the existing international framework of capitalism. Advocates of this view argue that the choice of economic policies is a reasonably technical matter and that it is possible for aid agencies to make objective recommendations. But these arguments obscure the political motives of international aid, especially from bilateral agencies, which seek to sustain or promote political and economic structures

beneficial, or at least not inimical, to the interests of the donor country.

Aid is, in general, available to countries whose internal political arrangements, foreign policy alignments, treatment of foreign private investment, debt-servicing record, and export policies are considered desirable, or potentially desirable, by the countries or institutions providing aid. These interests are particularly evident in the aid programme of the United States. In 1980, approximately a quarter of its aid budget of $5,600 million was allocated to development projects, a third to the Economic Support Fund, a quarter to food aid and the rest to the Peace Corps, operating expenses of USAID and to the multi-lateral aid agencies. The Economic Support Fund is aimed specifically at the provision of balance of payments, infrastructure and other capital and technical assistance to regions of the world in which the USA has special foreign policy and "security" interests. In 1980, 86 per cent of the fund was allocated to the Middle East - mostly to Egypt and Israel. These two countries received more aid than all the other development projects funded by USAID in the rest of the world. The top six recipients of US economic aid are also the top recipients of military assistance [Lappe (1980), p 15].

Political considerations are particularly important in explaining the disbursements of aid to Lesotho from the United States, the Federal Republic of Germany and Britain. These countries see it to be in their interest to maintain stability in southern Africa so that their substantial investments in the Republic of South Africa would not be jeopardised. Loans provide one means of ensuring political allegiance, as does the provision of Western expatriates in key administrative functions in the government, and the offer of scholarships to

Western universities.

The costs of political and economic alignment with donor countries are experienced mainly by the rural poor, whom the donor agencies purport to aid, while the government elite frequently benefit from the aid process. The government of Lesotho has specific motives for seeking to maximise aid receipts; there is little doubt that the BNP has seen aid as a means of maintaining power at the expense of the rural poor, who have been denied control over the resources which are supposedly being directed towards their development. Just as South African aid was used to support the BNP in the 1960s, international aid, unwittingly very often, has been used by the BNP to establish its dominance in the country. Many development projects have been used to ensure employment of BNP supporters at the expense of the BCP. For example, the provision of a new fleet of buses by Iran for the capital, Maseru, provided one opportunity for creating exclusive employment for BNP supporters. Another, more recent, example is the Labour Construction Unit, a Swedish funded labour-intensive works construction organisation, which has to hire all its labour through the Prime Minister's office.

Disbursement Procedures

The timing of aid agreements and disbursement procedures are often key elements in the effectiveness of aid programmes with delays in these procedures adding to the cost of aid to the recipient country. Most colonial countries, on gaining political independence, remained, initially at least, dependent upon foreign aid, mainly from the old colonial power. Gradually, Third World countries have begun to deal with more donors whose procedures and practices differ considerably.

This process has been evident in Lesotho in the 1970s. Reliance on the international aid market tends to lead to wasted administrative resources as considerable time and effort is spent dealing with the plethora of aid agencies, each with its own administrative procedures, financial years and policy objectives. Project priorities have to be reconciled with those of prospective donors; often, donors will agree to finance only selected aspects of a particular project, with the result that the whole design process has to be repeated and further donors approached. Dependence on foreign aid also tends to limit rational national budgeting and financial planning. This is apparent in Lesotho where financial decisions often have to wait upon foreign budgetary procedures. Even when aid agreements are finally signed, there are further delays while local aid agency staff check that material specifications and the proposed suppliers meet donor requirements. These delays in the aid process often mean that aid allocations are underspent. Foreign aid is also subject to the vagaries of the donor country's own internal political and economic situation. Hence, aid flows may diminish during periods of economic stringency in the donor country, and this may seriously affect the long term planning of projects.

Many aid projects tend to remove decision-making from local government control, and this can result in dispersed, unmanageable and possibly contradictory development policies. For example, the large rural development projects of the mid-seventies (such as the Thaba Bosiu, Khomokhoana, and the Thaba Tseka Mountain Development projects) were largely autonomous of government control and independent of ongoing government programmes. As a result the projects collapsed at the end of their funding periods with little to show for

the immense effort and resources that had been expended.

There has been a preponderance of project aid in the total which has been extended by donor countries. But, concentration on this type of assistance often results in the implementation of projects which are not of high priority to the recipient country which leads, in turn, to a non-optimal allocation of resources for investment. There has also been the belief, on the part of the Government of Lesotho, that development occurs chiefly as a result of large injections of capital and expatriate assistance into projects and programmes. "Programmatism" seems to dominate thinking on rural development policies with the emphasis on officially provided services and initiatives. A narrow and rigid view of what represents the permissible, and possible, range of government activities to promote rural development prevails. The only way to tackle problems is to run programmes; departments are allotted responsibility, staff are appointed, aid projects are approved, and sets of prescribed services are provided. This approach clearly excludes mobilisation strategies or any contribution from rural households. In this respect aid policies merely serve the interest of government bureaucrats and aid personnel at the expense of the rural poor.

Recurrent Budget Costs and the Repayment Burden

It has already been shown, in the analysis of Lesotho's economy, how aid has substantial hidden costs in the form of recurrent budget expenditure on maintenance and running costs of capital projects. The increased flows of aid to Lesotho have meant ever larger recurrent budgetary commitments. In recent years, these have been offset through the increased remittances from migrant earnings, but,

as these decline, the consequences of the recurrent costs of non-productive project aid are likely to become more apparent.

It should be noted, further, that direct capital grants form only a proportion of aid and that low interest loans often form a not inconsiderable part of these agreements. The debt service problem has been debated at virtually every international gathering convened during the past decade to discuss the economic problems of the Third World. In this respect, the term "aid" is a misnomer, a metaphor which is used conveniently by the donor countries to conceal the costs and consequences of aid to the recipient countries.

AID AND IDEOLOGY

These negative effects of the aid process require us to treat with caution the rhetoric of aid policy pronouncements which purport to demonstrate the commitment of donor countries to assisting the rural poor. It is when the costs of aid and the interests of donor countries are revealed that the ideological nature of these pronouncements become apparent.

The manner in which aid policies conceal the costs of aid to Third World countries, and mask the economic interests of donor countries, is one aspect of the ideological character of aid. There is another aspect which has become evident in the case study of Lesotho, and which may be generalised to other poor, agrarian nations; it is the extent to which ideological concerns, paradoxically, are transformed into rural development programmes whose objectives are to introduce "appropriate technologies" to meet the basic needs of the rural poor. It may be argued that these programmes merely legitimate the aid pro-

cess and disguise the economic interests which are the predominant feature of international aid. It remains the case, nevertheless, that the ideological character of the notions incorporated in aid policies play an important role in directing technological change in these poorer Third World nations.

The clearest effect of this phenomenon is, perhaps, observed in the choice of technologies in rural development programmes. The choice of new technologies in these projects has not, in general, been skewed towards imported capital-intensive technologies, and there have been few direct benefits for donor countries in the form of export orders or foreign policy gains. Procurement tying regulations have often been waived and it is noticeable that vehicles and equipment for rural development projects have been supplied from a variety of sources. For example, the Canadian funded Thaba Tseka Project included equipment manufactured in the USA, the United Kingdom, Germany and Japan. But equipment purchases were never a significant expenditure in these projects, and the prevailing ideology of appropriate technology allowed, for example, the creation of the Rural Technology Unit, a local research and development institution committed to the innovation and local manufacture of technologies appropriate to the needs and environment of rural Lesotho.

The paradoxical way in which ideological concerns are transformed into rural development programmes also affects the adoption of new technologies by rural households. The effect is altogether more complex than that of the choice of technology. It has been noted that technical assistance in aid-directed rural development programmes takes the form, chiefly, of technical knowledge transferred by aid personnel rather than the financing of capital projects or machinery.

The largest single budgetary item in the rural development projects which have been examined in this thesis, has consistently been on expatriate technical personnel. Processes of technological change, therefore, have been directed by foreign aid project staff who have transmitted technical knowledge from their Western scientific and technical education, training and experience into the rural environment of Third World countries. Before discussing the way in which the ideological interests structure the adoption of programmes of technological change in rural development, it is necessary to look more closely at the relationship between knowledge, ideology and interests.

Ideology, Interests and Knowledge

As a concept, ideology relies primarily on the idea of distortion. Beliefs which are ideologically determined are commonly held to be distorted in some way. Equally, it is impossible to conceive of this distortion unless there is a clear conception of how non-distorted knowledge is possible. In order to explore the implications of ideology it is necessary, therefore, to establish some idea of how knowledge is formed and what constitutes valid knowledge. This brings us to the complex and vast field of epistemology, and it is clearly beyond the scope of this thesis to embark on a detailed discussion of the theory of knowledge. It is sufficient here to distinguish between two main conceptions of knowledge (1).

One view of knowledge is that it is a product of contemplation by

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(1) This distinction has been made by Barnes (1977) and this section will draw heavily on his work and that of the "Edinburgh School" in the sociology of knowledge and science.

disinterested individuals passively perceiving some aspect of reality, and generating representations which directly and unproblematically reflect reality. Everyday epistemological notions appear to be thoroughly permeated with this view of knowledge. The metaphor "seeing" is commonly equated with understanding, and learning and passive visual apprehension are regarded as analogous. It is then argued that there can be only one true and valid system of knowledge which corresponds to reality. The main problem with this view is that there is no independent way of checking whether an individual's passively received perception of the world matches reality in any objective sense.

There is another view which regards knowledge as essentially social, and part of the culture which is transmitted from generation to generation (2). It accepts observation as a typical kind of learning, but insists that visualisation and depiction are not passive but active and socially mediated processes. Knowledge is produced by interacting social groups engaged in particular activities and is evaluated communally rather than by individual judgements. Its generation may be understood with reference to the social and cultural context in which it arises and its maintenance is not just a matter of how it relates to reality but also of how it relates to the objectives and interests a society possesses by virtue of its historical development. This is the view put forward by Barnes, who argues that:

> "Representations are actively manufactured renderings of their referents, produced from available cultural resources. The particular forms of construction adopted

(2) This view is represented, for example, in the works of Marx, Lukacs, and Mannheim and has been developed by Barnes (1974) and Bloor (1976).

> reflect the predictive or other technical cognitive functions the representation is required to perform when procedures are carried out, competences executed, or techniques applied. Why such functions are initially required of the representation is generally intelligible, directly or indirectly, in terms of the objectives of some social group" [Barnes (1977), p 6].

Knowledge arises out of our encounters with reality and is continually subject to feed-back correction from these encounters, as failure of prediction and control occur. Barnes argues that:

> "..... knowledge generally is primarily instrumental, in the sense that it is generated and evaluated in a way that is pre-organised by an interest in prediction and control, and normative, in the sense that it is sustained by a communal consensus which is decided, and not a rational necessity" [ibid., p 18,19].

He defines all knowledge as accepted belief and publicly available, shared representations. Belief, here, should not be taken to be individualistic or idiosyncratic fantasy, but a socially sustained consensus. Belief counts as knowledge in a manner which is independent of any historical assessment we might care to make of its rational justifiability, scientific status, or philosophic worth. All accepted beliefs are treated equally and symmetrically, rather than measured against an ideal of true or rational knowledge which is transcendentally sustained.

It is clear that these two theories of knowledge result in very different conceptions of ideology. In the first view, ideological and non-ideological knowledge correspond to the philosophically based distinction between false belief and true knowledge. Ideologically determined knowledge occurs when perceptions of "the way the world is" are distorted by illegitimate concerns. Beliefs are held to be ideologically determined if they are created, accepted or sustained only because they are related to particular social interests. Valid knowledge, on the other hand, is independent of social interests and

thus not amenable to explanation in terms of the society in which it is generated and sustained. It has conventionally been held that only false or irrational beliefs are considered in need of causal explanation. Social causation applied to rational beliefs is seen as a contradiction as it somehow maligns their very rationality. Barnes is unsympathetic to the proposed opposition between causation and rationality. Without an independent criterion of truth this view breaks down and makes way for a symmetrical treatment of "true" and "false" beliefs alike.

Once it is accepted that all knowledge is socially determined, an alternative conception of ideology is clearly necessary. It is possible, instead, to distinguish between ideological and non-ideological representations in terms of the different kinds of interests which inform each position. It is then argued that interests operate in all knowledge, but that they are of two distinct kinds. One is the overt interest in prediction and control, discussed above; the other type is a covert interest in rationalisation and persuasion. Barnes argues:

> "Hence, wherever knowledge is ideologically determined there is a disguise or concealment of an interest which generates or sustains the knowledge..... This gives us a basis for the definition of ideological determination. Knowledge or culture is ideologically determined in so far as it is created, accepted or sustained by concealed, unacknowledged, illegitimate interests"[ibid., p 33].

In particular contexts, beliefs may meaningfully be treated as ideologically determined, or even be called "ideologies", to the extent that concealed interests are thought to influence the people who sustain and propagate them. But we must guard against regarding such descriptions as references to the intrinsic properties of particular beliefs or knowledge. There is no explicit, objective set of rules

or procedures by which the influence of concealed interests upon thought and belief can be established. The identification of ideology is always context-specific rather than universal. Similarly, beliefs exposed as ideologically inspired are not necessarily ideological in all contexts. This is possible because all knowledge is rarely informed by legitimising and persuasive interests alone. Instead, such interests subtly interact with knowledge committed to an interest in prediction and control.

We should be cautious in advancing a necessary relationship between an ideology and a particular social class or group. The argument that there is a relationship between the representations of a group and that group's position in the social structure does not entail the necessity of predicting the content of the knowledge of a particular situated group. This follows from the perspective of knowledge as a resource, capable of being adapted to fulfil diverse ends. What is far more likely is that, by virtue of a group's position in the social structure, they will be predisposed towards the selection of certain sets of representations to serve as resources. The cultural resources available at any specific time are always the result of a complex historical development. The force behind selection is contained in the conception of interest. It is when these interests are unacknowledged and concealed that we can refer to knowledge as being ideological.

Technical Assistance and the Adoption of New Technologies

The above framework may be usefully employed to understand more fully the effect of ideology in the aid process. It is clear that many concepts embodied in aid policies do constitute ideologies, in the

sense that they conceal unacknowledged interests. These interests are predominant in structuring the design of aid programmes and we have noted how, in global terms, very little aid is actually directed towards the poor in spite of aid policy statements which stress the importance of doing just that. Instead, the aid process functions largely as an adjunct to the political and economic interests of donor countries.

The ideological character of aid policy is further demonstrated with reference to the concealed interests of Third World ruling elites. In the discussion on rural development programmes in Lesotho it was noted how government elites have assimilated and manipulated concepts in aid policies both to maximise the receipts of aid and to mask their positions of privilege and power which are maintained at the expense of the rural poor. World Bank policy statements indicating the importance of development aid being directed towards:

> "a strategy designed to improve the economic and social life of....the rural poor" [World Bank (1975a), p3],

are matched by Government of Lesotho pronouncements that:

> "....a major proportion of development expenditure will....be focussed on the rural poor.... [and] alternative technologies with differing implications for the number of jobs created and the share of wages will be analysed" [TFYDP, pp 51,52].

In the same way, the government has adopted the concept of integrated, decentralised rural development which involves "bottom-up" planning. Although most of the rural development programmes in Lesotho incorporated these objectives, rural people were consistently denied control of aid resources and any say in the design and operation of rural development programmes.

We have argued, however, that the ideological character of these aid

policies requires that they at least be seen to be implemented. Criticism of the way the aid process serves the economic interests of donor countries, and the privileged position of government elites in the Third World, may be deflected when rural development programmes can be cited which include among their objectives the introduction of "appropriate technologies" to meet the basic needs of the poor. To the extent that these ideological notions are transformed into actual programmes, the aid process becomes, paradoxically, the vehicle for the introduction of new technologies directed towards the rural poor. We have also noted the importance of the transfer of technical knowledge by aid personnel in these programmes and its effect on technological change. These processes may be seen more clearly when knowledge is understood as accepted belief and publicly available, shared representations. There is little doubt that in some aspects of aid programmes in Lesotho, aid policies have become resources which have been employed by sections of the aid community in the design and implementation of rural development programmes. These groups have been serious in their intent to introduce programmes which would improve the material welfare of the rural poor. Some aid personnel have valued and identified with such policies as decentralised and integrated rural development, "bottom-up" planning, assistance to the poorest and the adoption of appropriate technologies which are simple, low-cost, employment generating and compatible with the environment. These concerns were evident, for example, in the project management of Phase II of the Thaba Tseka Project and the creation of the Rural Technology Unit. These interests are, perhaps, institutionalised mostly in some of the smaller non-governmental aid agencies, such as Plenty. Nevertheless, they are also evident in the official aid agencies, amongst groups which, for example, have links

with communities concerned with appropriate technology in the donor countries. This aspect was demonstrated in the case of the solar energy project where the work of the American consultants was informed by their experience with community-based experimentation with alternative energy technologies in the US. Indeed, it has been partly due to pressures from groups such as these that aid agencies have thought it necessary to justify and legitimise aid with these ideological notions.

It should be recalled that in the discussion on ideology it was argued that beliefs exposed as ideologically inspired are not necessarily ideological in all contexts. Ideological concerns are not intrinsic properties of particular beliefs, and knowledge has the character of a resource communally exploited in the achievement of whatever interests actors decide. It is this feature of knowledge which partly explains the ironic and contradictory nature of aid programmes. Different social groups within the aid community have different interests. Concepts and notions incorporated in aid policies might be ideological in terms of the concealed economic interests of dominant groups, but legitimate in terms of those groups who seek overtly to use this knowledge as a resource in the programmes in which they are involved. The complex nature of these effects should not be underestimated, and these two aspects of the effect of aid policies on the nature of the technologies introduced in poor agrarian nations are not always easily distinguishable. Each programme and situation has to be examined individually in order to analyse the nature of the interests which inform the knowledge utilised by different groups in the aid process.

The role of ideology and knowledge in technological change has been

emphasised in order to explain the problems involved in the adoption and dissemination of new technologies. Implicit in much of the discussion in the case study on Lesotho, has been the contention that the vexed problem of why new technologies introduced in rural development programmes have not been adopted by rural households, may be understood, partly, in terms of the constraints imposed by the regional political-economy, and partly through an examination of the interaction of Western technical knowledge, transferred by aid programmes, with the knowledge and practices of rural households. In the discussion of ideology, interests and knowledge we came to the view, commonly held in the sociology of knowledge and developed more recently by Barnes, that knowledge is essentially social; that it is a part of culture and that its generation and maintenance is related to the objectives and interests a society possesses by virtue of its historical development. The point of departure of Barnes from the traditional sociology of knowledge (represented, for example, by the work of Mannheim) is the argument that all knowledge should be understood in this way, including the nature of scientific knowledge itself. This position clearly has implications for technical assistance programmes which have transferred Western scientific and technical knowledge to rural environments whose historical and cultural development has been vastly different from that of the donor countries.

It is an unfortunate fact that so much of the development literature either ignores any explicit discussion of the role of science and knowledge, or assumes uncritically that Western scientific and technical knowledge is universally valid, superior and therefore of direct relevance to rural households in Third World countries. For example,

Dickinson has argued that:

> "....while acknowledging the universality of the laws of science, we must extend consideration of the application of our scientific knowledge to a wider range of situations than is encompassed by the experience limited to our own society" [Dickinson (1975), p 218].

The implication is clear: while technologies to fit different situations in Third World countries must be developed, the suitability of Western scientific knowledge itself, as a resource for different cultures, remains unquestioned (3). Science has long been viewed as the most certain and most rational form of knowledge we have. Philosophers since the seventeenth century have been concerned to develop an ideal depiction of science as objective and these efforts have culminated in the formulation of hypothetical-deductive methodologies as characterising the distinctive scientific method [Popper (1959)]. But from a sociological point of view it is clear that, in practice, scientists in different disciplines do not adhere to the same methodological rules. Scientific theory, far from being universal, is culture-specific (4). Criteria of rationality and objectivity in Western science are not necessarily of relevance to beliefs which are held in other cultures. The study of different societies or cultures, therefore, has to reject the view that the world is intelligible in terms of one set of true, or uniquely reasonable beliefs and a wide range of causes of error and distortion. The "given" of the raw experience of reality does not translate naturally and unproblemati-

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(3) The implication that technology is merely applied science is also questionable. See Chapter Two.

(4) This view of science has been supported with reference to a number of detailed case studies. There is strong empirical content to much of the work of the "Edinburgh School" in the sociology of science. Shapin (1982), for example, has produced some studies ~~on eighteenth century science~~ which have demonstrated the interactive relationship between science and the wider culture.

cally into one independent language of observation. All knowledge and accepted belief has to be treated symmetrically.

It is not intended here to discuss extensively this view of science; this has been done by Barnes (1974) and Bloor (1976). It is sufficient to point out that, if this conception of knowledge and science is accepted, then it is possible to explain the failures of technical assistance programmes partly in terms of the problems of transferring knowledge which has arisen and developed in one particular social situation to another whose history, culture and socially accepted beliefs are very different. It is clear that the great majority of the aid community have been unaware of the assumptions implicit in technical assistance programmes. Our examination of colonial and post-independence rural development programmes has pointed to the way in which technical personnel, in their descriptions and evaluations of Basotho agricultural practice, frequently imply a comparative image of European agricultural practice. There have been repeated references in rural development project documents to the Basotho not being "genuine agriculturalists" or "serious farmers". These reports never define explicitly what constitutes "genuine" or "serious" farming but the implication is clear that their assessments are based on an uncritical acceptance of the universal validity of Western agricultural knowledge. However, it has been argued in this chapter that the generation of knowledge may be understood with reference to the social and cultural context in which it arises, and its maintenance is, in part, related to the objectives and interests society possesses by virtue of its historical development. Within this perspective, the knowledge transmitted by foreign technical personnel may not always be relevant to the current social and cultural situation of

the Basotho.

Furthermore, the failure, or rather, the reluctance of the Basotho to abandon or modify traditional forms of agricultural knowledge may be attributed, in part, to the interests which inform that knowledge. These interests have themselves been a response to an historical development, quite different to that of the donor countries, whereby the Basotho have experienced the effect of their growing dependence on migrant labour as a result of a century of economic dominance by imperial and mining capital in the sub-continent. These issues become more complex where non-agricultural technologies and knowledge is concerned and where Basotho decisions to adopt technological change are less affected by economic interests. We have argued, for example, that the reluctance of the Basotho to adopt the new technologies introduced by the solar energy project (particularly in the village trial where solar ovens were offered free of charge) must be attributable, in part, to the way in which the design of the technology was undertaken wholly within the framework of aid personnel's notions of what constituted an appropriate energy technology, and that the categories of knowledge implicit in the technology did not correspond with those valued and accepted by Basotho rural households.

The case study material for this thesis does not allow these arguments to be developed any further and any conclusions must necessarily remain at this general explanatory level. No thesis can hope to be exhaustive. Its value and originality, though, may lie in adopting new approaches to problems and pointing to areas in need of further research.

A proper understanding of technical change must be grounded in an appreciation of the full spectrum of culture and economy. The outsider seeking to achieve this must move as close as possible to the perceptions, beliefs, knowledge systems and practices of the society in question and compare them with his own. The comparative studies of Mary Douglas (1966) and Robin Horton (1967) of pre-literate societies and Western science were amongst the first in this vein (5). It should be remembered, though, that Sesotho culture is a complex assemblage of traditional pre-literate and Western knowledge systems, and is continually evolving as a result of the involvement of the Basotho in the regional economy. The conclusions of this thesis point to the need for further studies, perhaps by anthropologists who may be able to achieve a more profound understanding of alien culture than that achieved through the informal experience of the writer in his field work. An awareness of some cross-cultural empathy in the study of Third World science and economy is no substitute for the intensive study of alien communities and culture which is the hallmark of the discipline of anthropology. The relatively recent development of economic anthropology might also be of value here to the extent that it undertakes detailed empirical studies rather than sterile debates in grandiose theory. Any study of the interaction between the knowledge and culture of agrarian Third World societies and the intervention of international technical assistance programmes must, ultimately, be grounded in a political economy framework which makes clear the dominant material and economic interests and the way these have shaped culture, knowledge systems

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(5) Drawing on this work, Barnes (1973) has suggested that one way of comparing belief systems is to study the manner in which different cultures treat anomaly.

and the adoption of those new technologies which make feasible the meeting of material needs and welfare.

SUMMARY CONCLUSION

At the start of this thesis, two broad questions were posed with regard to technological change in rural development in Third World countries; which factors govern, firstly, the choice and, secondly, the adoption of new technologies.

There have been two strands of analysis evident in our attempt to answer these questions. The first has relied on a political economy approach, and a broad structural explanation of the history of technological change in Lesotho, within the regional economy of southern Africa, has been offered. The second approach has concentrated on the nature and significance of the knowledge which has been incorporated in aid programmes and its interaction with the existing knowledge systems of agrarian societies.

In dealing with the questions of the choice and adoption of new technologies within a political economy framework, it has been argued that the penetration of colonial and mercantile capital in southern Africa transformed traditional agricultural production such that it became oriented more and more towards exchange values by making the satisfaction of needs and subsistence more dependent on the sale, rather than the immediate use, of the product. The Basotho were drawn into commodity production, first through the sale of agricultural produce, and then, after the establishment of mining capital, through the sale of labour power in the mines of South Africa. At the same time, the land available to the Basotho was reduced, yet the

labour migration system still forced them to remain dependent on domestic agricultural production. It has been argued that this dual dependence of the Basotho on migrant labour and subsistence agriculture has had a profound effect on their attitudes towards technological change and innovation in domestic production. The new intensive pattern of settled agriculture required a transformation of traditional agricultural knowledge and techniques comparable to the introduction of the plough in the mid-nineteenth century, but the Basotho, because of the pervasive migrant labour system, have not been forced, indeed, they have not perceived it necessary, to adopt new technologies which would improve agricultural production.

Discussion of the aid process, the second key factor structuring technological change in rural development, has been extended in this chapter to examine the relationships between aid policies, ideology, and the transfer of technical knowledge. The approach has been to indicate both the importance and the nature of the effect of aid as a vehicle for technological change in poor agrarian nations. By pointing to the economic costs implicit in the aid process, the ideological character of aid policies, which purport to demonstrate a concern for the rural poor while concealing economic interests, has been demonstrated. But, because the ideologies of integrated rural development, basic needs, and appropriate technology have so permeated aid policy documents and pronouncements of the 1970s, these emphases have, in certain cases, paradoxically influenced the design of aid projects. In the case of Lesotho, the significance of this effect has been noted, not only for the choice, but also for the adoption and dissemination, of technologies introduced through rural development programmes. The latter process has involved the complex

question of the interaction between Western scientific and technical knowledge and traditional Basotho practices and beliefs.

It might appear, at first sight, that the political economy approach and the emphasis given to the transfer of knowledge in aid programmes, are disconnected and disparate forms of analysis. Reliance on the power of knowledge and ideas and their significance in understanding social change leads easily to various forms of philosophical idealism which would contradict the materialist underpinnings of the political economy framework used in our analysis of the structure of Lesotho's economy and its historical development. Political economy, grounded in the historical materialism first propounded by Marx and Engels, rejects any notion of history which grants a determining role to the ideas which men hold in explaining their actions and social change in general. However, it should be clear that the view of knowledge which has been adopted in this thesis would also imply a rejection of idealism. Knowledge has been linked to interests and it is the active pursuit of interests which brings about social change and determines the fate of ideas. Technological change arises not because men are determined by new ideas, but because they actively deploy their knowledge in a new context as a resource to further their interests. Although there is a school of thought within political economy which asserts that the course of social change may be mechanically predicted from objective material laws inherent in the economic "base" of society, it is also clear that Marx devoted some attention to the significance of knowledge in social and technological change (6). Production is necessarily the accomplishment of cognitive, knowledgeable, socialised groups of men and women and their

(6) See for example the German Ideology by Marx and Engels (1970).

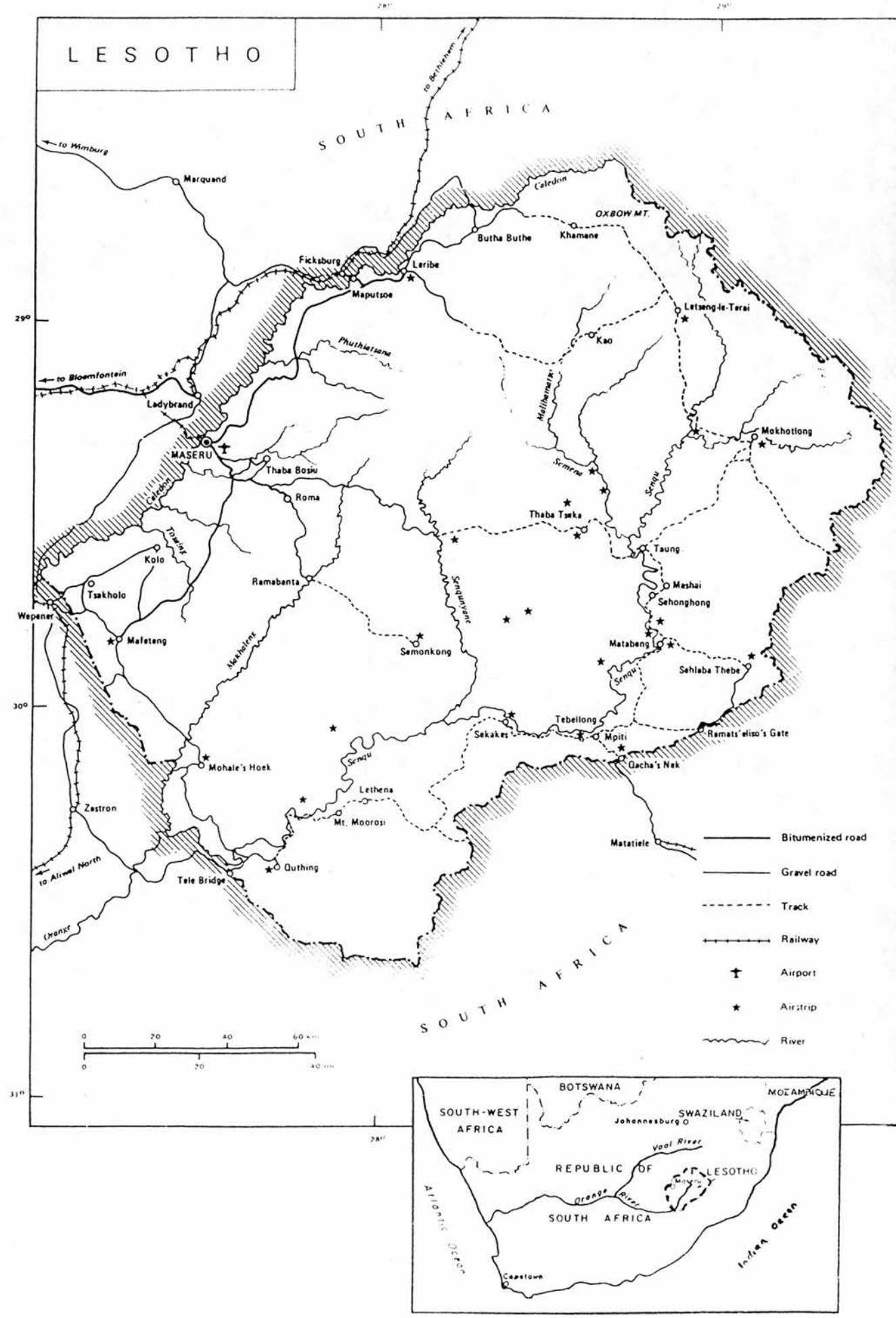
actions are, in the long term, directed towards the fulfillment of needs and the furthering of interests. How activity can fulfill a need or further an interest is decided upon the basis of knowledge. Knowledge is a resource in activity and not a direct determinant of it, and no account of technological and social change is acceptable which denies this role.

Finally, it remains the case that poor agrarian societies face increasingly severe hardships which are likely to deteriorate as the international distribution of economic power remains unreformed, populations increase and natural resources are depleted.

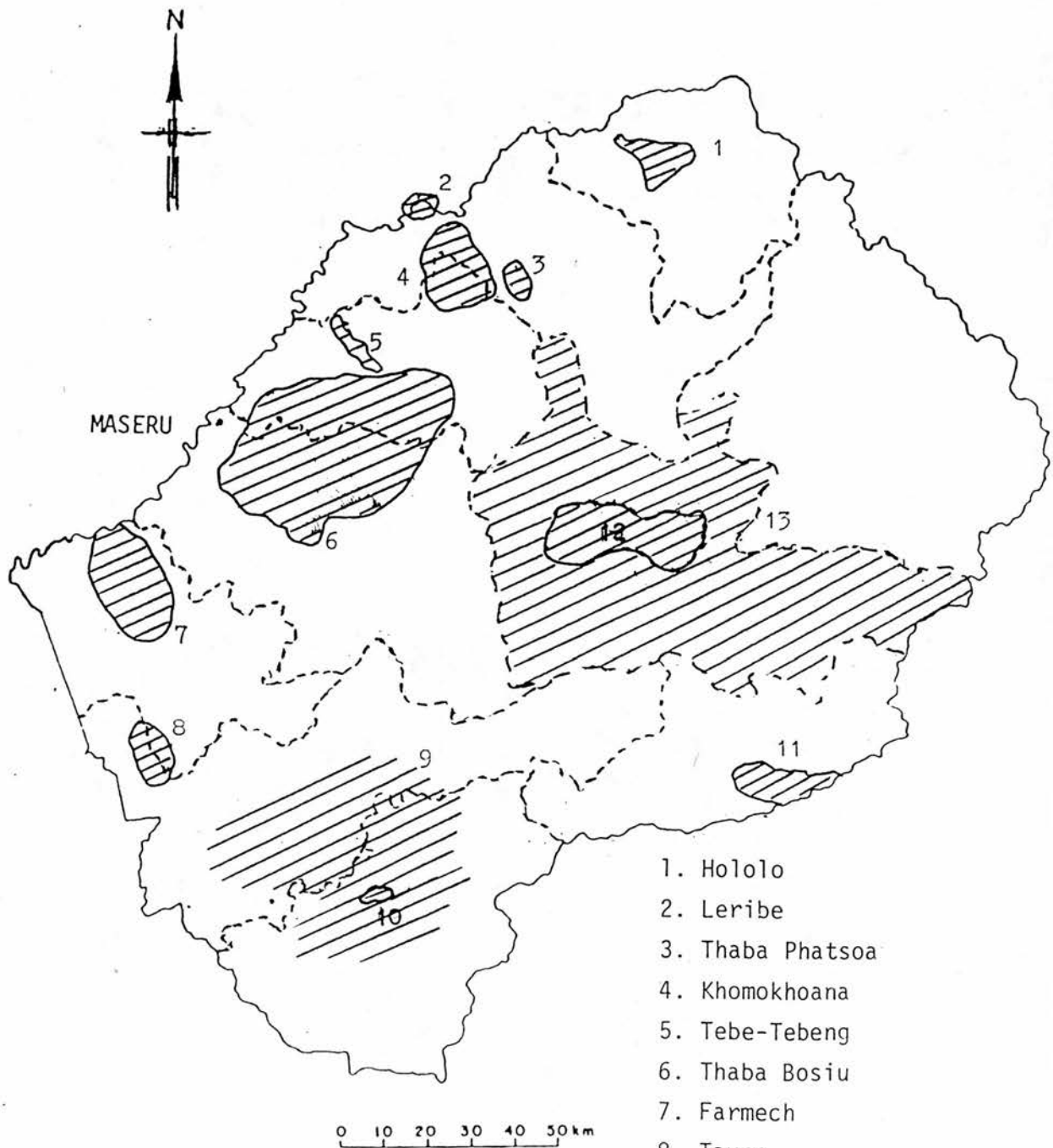
Yes, most rural development programmes have been failures, often through their insensitivity to the fact that traditional practices of Third World rural households are based on centuries of experience of survival under difficult conditions, and their ignorance of the concern of villagers when adopting a new technology that it not only offers a benefit over existing practices, but also a risk not significantly greater than those associated with these practices. But rural development programmes aimed at introducing technological change and material improvement in poor agrarian societies will fail less often, perhaps, when they begin to take the knowledge systems of these societies at least as seriously as they take Western science.

APPENDIX I

MAPS OF LESOTHO INDICATING SITES OF RURAL DEVELOPMENT PROGRAMMES


LESOTHO
SOUTH AFRICA
to Bethlehem
to Wimburg
Marquand
Caledon
OXBOW MT.
Butha Buthe
Khamane
Ficksburg
Leribe
Maputsoe
Letseng-le-Terai
Kao
Phuthiatsana
to Bloemfontein
Ladybrand
Malibamatso
Mokhotlong
MASERU
Thaba Bosiu
Senqu
Roma
Thaba Tseka
Caledon
Kolo
Tsakholo
Ramabanta
Taung
Mashai
Sehonghong
Wepener
Mafeteng
Matsoku
Semonkong
Matabeng
Sehlaba Thebe
Tebellong
Sekakes
Mpiti
Ramats'eliso's Gate
Qacha's Nek
Mohale's Hoek
Lethena
Zastron
Mt. Moorosi
Matatiele
to Aliwal North
Qutting
Tele Bridge
Orange
Bitumenized road
Gravel road
Track
Railway
Airport
Airstrip
River
0 20 40 60 km
0 20 40 km
29°
30°
31°
28°
BOTSWANA
MOZAMBIQUE
SOUTH-WEST AFRICA
SWAZILAND
Johannesburg
Vaal River
REPUBLIC OF
LESOTHO
Maseru
Orange River
SOUTH AFRICA
Atlantic Ocean
Indian Ocean
Capetown

RURAL DEVELOPMENT PROJECTS IN LESOTHO



1. Hololo
2. Leribe
3. Thaba Phatsoa
4. Khomokhoana
5. Tebe-Tebeng
6. Thaba Bosiu
7. Farmech
8. Taung
9. Senqu
10. Plenty
11. Rankakala
12. Thaba Tseka I
13. Thaba Tseka II

APPENDIX II

CAPITAL AND FOOD AID TO LESOTHO

[1] CAPITAL ASSISTANCE TO LESOTHO

Source of Assistance and Projects	Commitments for 1979 and beyond $ million
United Kingdom	
Basic Agricultural Services	2.15
Intensive Horticultural Production	.25
Woodlots project	.70
South East Woodlot Programme	1.27
Intensive Arable Area Conservation	1.27
Lesotho Agricultural College Phase IV	.25
Mountain Livestock development Prog.	2.9
National Pig Breeding Herd	.22
Fisheries Development	.28
Mechanical Assistance to Food Tracks	1.23
Telecommunications	1.43
Offices, District Markets	1.71
Orthophoto Mapping	1.39
Employment Opportunity Project	1.41
Village Water Supplies	.85
Rural Clinics	.76
National University of Lesotho	1.19
Primary Schools	1.27
Survey Office Phase II	.25
	20.76
Canada	
Lesotho Airways, Aircraft and training	2.13
Low Income Housing Development	2.91
National University of Lesotho	2.55
Thaba Tseka Phase I	5.31
Thaba Tseka Phase II	6.53
	19.43
Denmark	
Maseru Abattoir	1.08
National Teacher Training College	.06
Institute of Extra-Mural Studies	.09
New Qacha's Nek Hospital	.49
	1.73

Source of Assistance and Projects	Commitments for 1979 and beyond $ millions
Federal Republic of Germany	
Commodity Aid (oil supply)	8.35
Lesotho Freight Services	1.7
Earth Satellite Comm. System	6.7
Commodity Aid	3.4
	20.15
Netherlands	
Mafeteng - Tsoloane Road	1.5
Medicines	2.13
Lesotho Dispensary Assoc.	.63
	4.25
Sweden	
Labour Intensive Constr. Unit	.81
Switzerland	
Village Water Supply	.68
Morija Nurses Training School	.08
	.76
United States	
Instructional Materials Resource Centre	2.9
Lesotho Distance Teaching Centre	2.69
	5.59
Abu Dhabi Fund	
National Airport	1.00

Source of Assistance and Projects	Commitments for 1979 and beyond $ millions
African Development Bank	
Phuthiatsana Project	4.59
Roma - Semonkong, Leribe - Oxbow Road Study	.32
Development Health Services	2.71
Maseru Water Supply	6.26
Leribe - Joel's Drift Road	4.85
Feedlots	5.42
Maseru International Airport	10.01
Industrial Development	2.67
	36.82
Arab Bank for Economic Development on Africa	
Maseru International Airport	6.00
Mafeteng - Mohales Hoek Road	3.55
	9.55
Commonwealth Development Corporation	
Lesotho Housing Corporation	1.4
European Economic Community	
Mafeteng - Tsoloane Road	3.74
Phuthiatsana Conservation Project	.64
Annual Microproject Programme	.12
	4.50
Kuwait Fund for Arab Economic Development	
National Airport	4.44
OPEC	
National Airport	3.00

Source of Assistance and Projects	Commitments for 1979 and beyond $ millions
Unitarian Service Committee of Canada	
School Projects	.06
Agricultural Projects	.11
Weavers Co-operative	.03
	.20

[2] FOOD AID

Source of Assistance and Projects	Commitments for 1979 and beyond $ millions
Catholic Relief Services	
CRS Food and Nutrition Programme	6.90
Warehousing Grant	.12
	7.02
Save the Children Fund Unitarian Service Committee of Canada	
Primary School Feeding	1.31
World Food Programme	
Primary School Feeding	1.99
Institutional Feeding	.37
Food for Work	2.29
Mountain Emergency Food Reserve	.65
National Strategic Reserve of Wheat	1.64
	6.94

Source: UNDP (1980), pp 39-42.

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~~BAER, W. (1976). "Technology, Employment and Development: Empirical Findings", World Development , Vol 4, No 2, pp 121-130.~~

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